

IN SEARCH OF WILD FLOWERS

WITH J. F. RAYNER



EARLY PURPLE ORCHIS

A, diagram of flower; B, pollinia; C, pollinia on head of insect, first position; D, pollinia on head of insect, second position.
(See pp. xiii, 43.)

[Frontispiece

The World of Youth Library, No. 13 (Outdoor Section)

IN SEARCH OF WILD FLOWERS

WITH J. F. RAYNER, F.R.H.S.

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A PRELIMINARY TO THE SYSTEMATIC STUDY
OF BOTANY

*With Fifty-three Figures in Black and
White, and a Frontispiece in Colour, by*

MARGARET V. RAY

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PREFATORY NOTE

THIS little work owes much to the care given it by my friend Mr. Charles B. Bonner, M.A.(Cantab.). He has read the MS., and from long experience as a schoolmaster has been able to make many valuable suggestions. I have also to acknowledge a number of important suggestions from Dr. Dukinfield H. Scott, M.A., LL.D., D.Sc., Ph.D., F.R.S., F.L.S., F.G.S., who has taken a kindly interest in the work.

J. F. R.

FOREWORD

THIS book is intended to be used in conjunction with work in the open. The young student, with the plant before his eyes and the place of its finding fresh in his memory, will read in the book such distinguishing characteristics as a novice may be expected to remember. Diagrams in black and white are provided to make observation easier and to aid the inexperienced draughtsman. Technical words on their first appearance (sometimes more often) are printed in heavy type and shortly explained. At the end of each chapter these words are listed for recapitulation. A few exercises and questions have been added. The answers to all may be found in the book. The same question may be asked of a beginner or an honours man; the answer expected will not be the same.

Progress in the study of botany is often impeded by a lack of field experience and by consternation at the vocabulary employed. It is hoped that this little volume may save tears.

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ABBREVIATIONS IN ILLUSTRATIONS

ETC.

<i>a</i> , anthers.	<i>pi</i> , pistil.
<i>b</i> , bulb, bulbil.	<i>po</i> , pore.
<i>bd</i> , bud.	<i>pp</i> , pappus.
<i>br</i> , bract.	<i>r</i> , root.
<i>ca</i> , calyx.	<i>rf</i> , ray floret.
<i>co</i> , corolla.	<i>rh</i> , rhizome.
<i>df</i> , disc floret.	<i>s</i> , stigma.
<i>f</i> , flower.	<i>se</i> , sepal.
<i>fl</i> , floral leaves.	<i>sp</i> , spathe.
<i>ft</i> , fruit.	<i>sr</i> , spur.
<i>i</i> , involucre.	<i>st</i> , stamen.
<i>l</i> , ordinary (foliage) leaves.	<i>sy</i> , style.
<i>n</i> , nectary.	<i>sx</i> , spadix.
<i>o</i> , ovary.	<i>t</i> , trumpet.
<i>p</i> , perianth.	<i>tn</i> , tendril.
<i>pa</i> , palea.	<i>tu</i> , tuber.
<i>pe</i> , petal.	♂, male flower or plant.
	♀, female flower or plant.

IN SEARCH OF WILD FLOWERS

I. WOODLANDS

"In the Spring the wanton lapwing gets himself another
crest,
In the Spring the eager bot'nist now begins in woods
his quest."

Locksley Hall—adapted.

As soon as the sun is strong enough, and the days are long enough (which also is poetry, as Mr. Peggotty would say), the field-botanist, the lover of wild flowers, arouses himself (or herself, of course), and with collecting tin on hip, "Hayward"¹ in pocket, magnifier pendent from neck, and stick in hand, sallies forth to wood or copse, for here he finds his earliest harvest, since spring flowers are chiefly woodland flowers. Other places yield some also, it is true—by ditches the Lesser Celandine (II, 1), in hedges the Stitchwort (II, 4) and

¹ Hayward's *Botanist's Pocket Book*, revised by Druce, 19th edition, 1930 (5s., Bell).

the Barren Strawberry (II, 5), in clayey fields the Coltsfoot, in pastures the Daisy (III, 8), and so on. But most of our famous and favourite spring flowers are inhabitants of the woods, such as the Primrose, the Bluebell, and the Anemone.

There is a good reason for the earliness of woodland flowers, as there is for most things, if we do but look for it. The business of a plant, as of all living things, is to find for itself "a place in the sun," to produce offspring, and to give them the best chance it can in the great struggle for existence. That is why woodland plants are in a hurry; they have to grow, develop their flowers, and set their seeds before the trees above them expand their foliage, and the dense shades of summer shut out the flowers from light and rain and visiting insects that carry the fertilising pollen from blossom to blossom. Moreover, woodland plants do not trust for their perpetuation to seeds only; they are all, I think, without exception perennial plants (going on year after year), increasing not only by seed, but at the root as well, by means of offsets, runners above or below ground, prostrate shoots that root as they spread, and the like.

Thus the spring-flowering Wood Spurge is a perennial, sending out fresh growths every year from the old rootstock, while the sparges

of the open ground, such as the Sun Spurge and the Petty Spurge, summer and autumn flowering, are **annuals** (which flower only once, then die), and trust to their seeds entirely. So with the mercurys; the early-flowering Dog's Mercury of the woods increases by means of its stringy underground runners into a perfect army, while the late-flowering Annual Mercury, of weedy gardens, is content with scattering its plentiful crop of seeds.

However, there are a few summer- and autumn-flowering plants in woods, but always in the more open parts; to them we may return in due time. Now we must remark that all woods are not hospitable to their lowly relations. Under beeches, under pines—anywhere that is too densely overhung—the flowering plants will be sought for in vain. A mixed wood, where the trees are not too big or spreading, where there are fairly open spaces, and if possible a stream or two—that is the place for spring flowers. To such a wood we will now bend our steps. What do we see first?

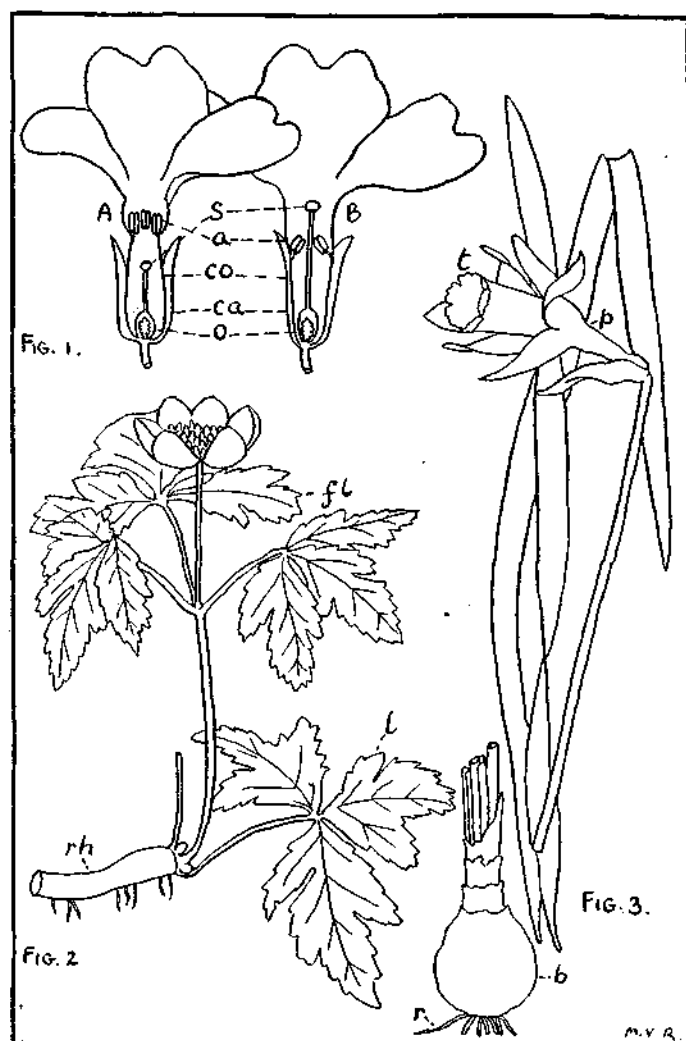
I. Primrose (*Primula acaulis*).

The Primrose may not always be literally *prima*, the *first* flower of the spring, for the

Daffodil sometimes precedes it. As for the Snowdrop, it marks rather the departure of winter than the advent of a brighter season; but the Primrose is without question first in our hearts. It also appeals to our brains, as we shall find if we gather a few blossoms and leaves, and look at them closely.

The first thing we shall notice is that the corolla, the coloured conspicuous part of the flower, is all in one piece, not in separate divisions or petals, as is the case with the Buttercup and many other flowers. They look separate, it is true, being deeply cleft into *five* notched lobes, but they will be seen to be united below. In the middle of the flower, encircling the tube, is a ring or five patches of a darker colour, forming what gardeners call an "eye." These are supposed to be honey-guides for insects. So far all primroses are alike, but there are really two kinds. All the flowers on any one plant will be of the same kind (Fig. 1). In the mouth of the tube you will see in the one sort a round, greenish, shining knob like the head of a pin; in the other a cluster of long, yellowish objects pressed together. In the first, called "pin-eyed," the knob or stigma (pollen-catcher) is pushed up by the length of its support (style); in the other, called "thrum-eyed," the five anthers (pollen-cases) are uppermost. All

PLATE I.



SOME WOODLAND PLANTS

Fig. 1, Primrose, long section of flower (A, thrum-eyed; B, pin-eyed); Fig. 2, Wood Anemone; Fig. 3, Daffodil.

primroses have both stigma and anthers; the difference is only in the length of the styles and the position of the anthers; in the pin-eyed the stigma is on a long style and the anthers on their short filaments below; in the thrum-eyed it is *vice versa*, as can easily be seen by splitting a flower of each sort. This is a device for cross-fertilisation, which, as Darwin proved, produces stronger progeny. It will easily be understood how it prevents insects from dusting the stigma (which communicates with the ovary or case containing the baby seeds or ovules) with that flower's own pollen or fertilising dust, necessary for the development of the ovules into ripe seeds. Cross-fertilisation means that the ovules of one plant are fertilised by the pollen of another plant.

Primrose flowers look as though they were borne singly, each on its own pinkish, hairy stalk. In reality there is a common stalk (peduncle) from which all the foot-stalks (pedicels) spring, just as in the Cowslip (III, 6), the Oxlip, and the garden Polyanthus, but it is very short, and hidden in the base of the leaves. In gardens both ways of flowering will often be seen on the same plant. The rosette of crinkled leaves is very characteristic and beautiful; dig up a plant and note the thick, rugged rootstock (rhizome), which holds

a store of food, and which branches to form other rosettes.

2. **Wood Anemone** (*Anemone nemorosa*).

The Wood Anemone (Fig. 2) is almost as different from the Primrose in looks as any plant can be from another. Instead of a simple leaf, crinkled, but with even margin (edge), we have one in three parts, each deeply divided, the surface quite smooth; they come, not in rosettes (bunches), but scattered singly here and there, the flowers likewise. The flower-stalks are a good deal taller, smooth and wiry in appearance, but brittle, and each carries a kind of collar of floral leaves of the same pattern as the foliage (ordinary) leaves, but smaller. The difference of habit is due to the rhizome, which, instead of growing more or less upright, pushes its way horizontally through the soft, spongy leaf-mould of the woods. The flower often hangs or nods, always, I think, when unexpanded, showing its reverse or outside, which is frequently tinged pink, more rarely crimson, otherwise it is white. This is the calyx (or outer cup), which in the Primrose and most other flowers is green. It consists of six distinct parts or sepals. This is odd, because, being net-veined, they should be four or five

(see Daffodil, just below, and Lesser Celandine (II, 1).

There is no corolla.

The stamens are several times *five*. It has no honey; insects visit it only for pollen. The seeds are clustered together, each one in a separate case, called an *achene*; in the Primrose the numerous seeds are contained in a common vessel named a *capsule*. The Wood Anemone is a most dainty and delicate thing, and needs care in handling or it will not get home in good condition.

3. Daffodil (*Narcissus Pseudo-Narcissus*).

The Daffodil (Fig. 3) differs more from the Primrose and the Anemone than they do from each other.

There are two great primary divisions of flowering plants: those with *two* seed-leaves (*cotyledons*), *netted* veins, parts of the flower usually in *fours* or *fives*; and those with *one* cotyledon, *parallel* veins, and parts of the flower in *threes*. The Daffodil belongs to the latter, the other two to the former.

The well-known yellow flower consists of a *perianth* (combination of calyx and corolla) of *six* limbs or segments, with a long "trumpet" in the centre, which is also six-lobed, but very slightly. This is a peculiar feature

which puzzles the most learned botanists. The anthers (or pollen-cases) are *six*, the ovary (or young seed-vessel) is *three*-celled; it lies below or outside the flower, whereas in the Bluebell and the Lily of the Valley, to which it is closely allied, and which we shall examine next, the ovary is within the flower.

The two or three leaves are bluish-green, narrow, strap-shaped, usually held erect by a slight twist, and hardly as long as the stoutish, succulent (thick and fleshy) stalk, which bears a single flower. Observe the brownish, papery sheath, called a *spathe*, which covered the flower before it expanded, and was then green. This is formed in the same way as the large, purplish-green hood of the Cuckoo-pint (II, 7), or the fine white one of the Arum-lily of florists' shops. The rather fleshy roots descend from a bulb, which is really a special kind of underground bud, with fleshy scales, containing stored-up food. The bulb gives off little ones, known as *offsets*, by which it increases, as well as from seed.

4. Bluebell (*Scilla non-scripta*).

The Bluebell, or Wild Hyacinth, is hardly second to the Primrose in popularity. It certainly deserves its high place. For beauty

of effect in the mass there is nothing to match it in the woods, and very little out of them. None who has ever seen them is likely to forget the

. . . sheets of Hyacinth

That seemed the heavens upbreking through the earth.

The Bluebell, when vigorous, will often grow 15 or even 18 inches high, and carry a great number of bells in an arching **raceme** (or chain), which becomes erect in seed. The six deep divisions of the perianth are elegantly curled back. The leaves are channelled and rather **lax**, so that the upper half often droops. The ovary (or seed-box) is within the flower, which therefore belongs, not to the daffodil, but to the lily group.

It must not be confounded with the Bluebell of Scotland, which southerners know as the Harebell or Hairbell (*Campanula rotundifolia*).

5. Lily of the Valley (*Convallaria majalis*).

The Lily of the Valley, never one of our commonest flowers, is now, alas! becoming scarce. Hawkers dig it up without pity, and will soon make it as rare as they have made the Royal Fern and other ornamental plants.

In some ways the Lily of the Valley is very different from the Bluebell, though so closely related to it. The texture of the plant is dry

and tough, not juicy and brittle, as in the other. The broad leaves are usually in pairs; the snow-white bells, with their intoxicating perfume, are almost globular, the stem hardly curved. There is no bulb; the buds or **crowns** arise from a mat of stringy, fibrous roots, by which, under fair conditions, it spreads rapidly.

6. Solomon's Seal (*Polygonatum multiflorum*).

A near relation (Fig. 5) of the Lily of the Valley, but much taller. When vigorous it will send up stems 2 ft. high or more, but they do not look so tall. The upper part bends as at an angle, so that the tufts of **pendent** (hanging), tubular, six-cleft, greenish-white flowers hang free, covered or shaded by the long, oval or lance-shaped leaves, which come *alternately*, not in pairs; their parallel veining is very apparent. The general effect of the plant is palm-like. The fruit is a purplish-black berry, which is said to be *poisonous*.

Solomon's Seal is remarkable for its very thick, creeping **rhizome** (or underground stem), on which a succession of sockets will be seen; these are the scars left by the stems of past seasons, last year's being nearest to the current year's, of course. It is on account of these seal-like marks that it gets its name, associated

with that of the mighty magician King Solomon. Our ancestors believed in its efficacy in "sealing" or stopping bleeding, and curing wounds.

7. **Butcher's Broom** (*Ruscus aculeatus*).

The Butcher's Broom (Fig. 6) does not look like a lily, but it is one; at least it belongs to the lily family. Examine the tiny flowers; they are six-rayed, and the ovary is within, not below. The leaf-like structure on which they appear has parallel veins, a mark of the great botanical division (monocotyledons or one seed-leaf plants) to which the lily family belongs. I believe this rigid, bristly shrub is the only native shrub that does so belong. I said "leaf-like structure" because these flattened, oval growths are considered to be modified branches by most botanists, who term them **cladodes**. The true leaves appear just below the cladodes; they are extremely small, and soon drop.

The flower, which seems to be seated right on the centre of the cladode, has really a stem of its own closely attached to the cladode, and running down it to the stem of the bush. The pistil, or ovary with its stigma, is not accompanied by the anthers; they are borne on separate flowers, as in the familiar

FIG. 4. Male and female reproductive parts of a plant. The male part (♂) shows a long, segmented structure. The female part (♀) shows a single flower with a long style.

FIG. 5. Male and female reproductive parts of a plant. The male part (♂) shows a long, segmented structure. The female part (♀) shows a single flower with a long style.

FIG. 6. Male and female reproductive parts of a plant. The male part (♂) shows a long, segmented structure. The female part (♀) shows a single flower with a long style.

FIG. 7. Male and female reproductive parts of a plant. The male part (♂) shows a long, segmented structure. The female part (♀) shows a single flower with a long style.

Fig. 4, Hazel; Fig. 5, Solomon's Seal (*gp*, growing point; *sm*, present season's stem middle portion).

case of the Vegetable Marrow ; in other words, there are fruiting flowers and " false " flowers. In this case the fruit is a large, round, bright scarlet berry.

The Butcher's Broom is a true woodlander. It is so called because formerly used for cleaning butchers' blocks.

8. The Bugle (*Ajuga reptans*).

The Bugle (Fig. 7) likes moist places in woods and meadows. It takes us back to the net-leaved plants (technically known as **dicotyledons**) to which the Primrose belongs, and, like the Primrose, it has the coloured corolla all in one piece, but instead of being arranged in a flattish disc, it is tube-shaped, with a pair of lips, hence the large and important group to which it belongs is called **Labiatae** (or Lipped Flowers). The lower lip forms a convenient landing-stage for insects, and these plants have other and very remarkable arrangements for the visits of their winged friends, as we shall see by and bye.

The leaves of the Bugle are smooth and glossy, of a rich green, often passing to purplish-brown, especially those of the flower-stalk, which is square and stiffly erect, and varies in height from a couple of inches in some to a foot in others. The flowers are in

rings, each ring above a pair of leaves, at right angles to the pair above and below, and growing shorter upward. They are blue, or occasionally white, in which case the leaves are a lighter green; this is always so with vegetable albinos. Like all plants of the Lipped or **Deadnettle** family, its seeds are in four little things like tiny nuts (nutlets), but it also increases freely by its creeping stems, pushing out in every direction, which soon root and form independent plants.

9. **Wood-sorrel** (*Oxalis acetosella*).

The Wood-sorrel shares with the Lesser Yellow Trefoil and the Black Medick the claim to be the true Shamrock of Ireland, which St. Patrick took as an emblem of the Trinity in his work of converting the people of the Green Isle to Christianity; but the White or Dutch Clover is now, I believe, more commonly worn on St. Patrick's Day, the 17th of March, though this plant is not a true native of Ireland. It is not perhaps generally known that Queen Victoria placed the Irish Trefoil in her royal diadem in lieu of the French fleur-de-lis.

The leaves of the Wood-sorrel are almost exactly like those of the smaller **trefoils** (or clovers), *three* top-shaped or heart-shaped

leaflets attached together by the narrow or pointed end, but in our fairy of the woods they are thinner and of a much more delicate green. They are often tinted red or purple on the underside, as are also the little (2- and 3-inch) flower-stalks.

There is no daintier plant in the woods or out of them than this, with its comparatively large, **solitary** flowers—solitary in the sense of only one to each stalk, which rises direct from the root—of five, rather broad, petals. These petals are coloured white or faintly lilac and streaked or veined with purple. Such coloured veins are thought to be honey-guides for insects, like the “eyes” of the Primrose. The flowers are cup-shaped and drooping when unexpanded, and saucer-shaped and erect when fully open, which is only in bright weather. Being shallow or flattish flowers, their honey is easily reached by the smaller, short-tongued insects, flies, beetles, etc., whereas in tubular flowers the honey is only reached by longer-tongued insects, like the humble-bees. The five petals of the Wood-sorrel are often joined together at the base, and they are twisted when in bud.

The seeds are packed away in an elastic case, which, on ripening, curls back, and throws the seeds to a distance. This **explosive mechanism**, as it is called, is one of the many

devices of Nature for scattering seeds; it is clear that it gives the offspring better chances in life than if they all dropped together. Moreover, the Wood-sorrel bears, late in summer and in autumn, small, closed, colourless, simplified flowers, that are self-fertilised and produce seeds which on ripening are laid on the ground, or even buried in it. The Violet, the Henbit, and I believe other plants, also bear these supplementary "secret" flowers, as I may call them, this being a short translation of the fearful-looking term "cleistogamic," by which they are known in scientific books.

Another remarkable feature in the life-history of the Wood-sorrel is the closing of the flowers and leaves at night or in dull weather, a faculty shared by the flowers of the Daisy, Pimpernel, and many others. The leaves, too, collapse from their common centre, and each leaflet folds on itself. This "sleep" of plants is very evident in the clovers, too, and is believed by botanists to keep them warm and moist, while the closing of flowers shields the important organs within from rain or dew.

10. Trees and Shrubs.

It will not do to leave the woods without a word about the trees and shrubs, especially as they are mostly Spring-flowering, but we have left ourselves little time for them. We must pass those lovely things, the Crab Apple and the Wild Cherry, and come at once to less showy but still interesting tree-blossoms. These are often arranged in **catkins**. A catkin is just a string of anthers or pistils, with attendant **bracts** (small scaly leaves)—the simplest flowers one can think of. The stamens and pistils are always in separate catkins, sometimes on the same tree and sometimes on different trees, as in the Willows. The **Goat Willow** or **Sallow** is one of the best-known of this family. It is sometimes called "Palms," because it used to be gathered for Palm Sunday. The pollen-bearing *male* or "barren" catkins are indeed very ornamental, with their silvery, silky hairs and bright yellow anthers. The fruiting, *female* or fertile catkins, which, as we have said, are borne on different trees, are not so pretty. The pistils are green, flask-shaped, with dark-brown or blackish stigmas. Both have **nectaries** (honey-cups) and are visited by insects. In shape they are shorter and thicker than catkins fertilised by the wind (which we are going

to look at in a minute), and are upright, not hanging or drooping, as it is not necessary for the pollen to be shaken out by the breeze.

The **Alder** (*Alnus glutinosa*), that lover of wet places, is easily known by its purple, three-cornered twigs, with darker, stalked buds. Both the stamen and the pistil catkins are to be seen throughout the winter, the stamen catkins being the larger, and hanging nearer the ends of the twigs, both sorts in clusters of three or four; they, too, are of a fine purple colour. After fertilisation, the pistil catkins become hard and woody, almost like the cones of fir-trees. They stay on the tree after the seeds have been scattered, and the gaping, blackish, old cones will easily be noticed.

In the **Birch** (*Betula alba*) only the stamen catkins are to be seen during autumn and winter. In spring they lengthen and droop, the scales separate, and the pollen is blown out as with the Alder. The pistil catkins come out with a few leaves from buds a little way down the shoot. They are upright at first, and smaller than the pollen catkins, but on fertilisation they get much bigger and hang down.

The stamen catkins of the **Hazel** (*Corylus Avellana*) (Fig. 4) are like those of the Birch, but come into action earlier. The pistils are

not in catkins, but in fat buds, from the top of which a tuft of about twenty bright scarlet stigmas sticks out.

In the **Beech** (*Fagus sylvatica*) the clusters of stamens are on a long, hanging stalk (peduncle), like a blind-tassel on its cord. The pistil-clusters are upright, higher up on the twig.

In the **Oak** (*Quercus robur*) the flowers are arranged in nearly the same way, only the hanging peduncle bears several smaller clusters of stamens a little way apart; the stiffer peduncle of the pistil flowers bearing two or three, which of course become acorns.

EXERCISES.

(1) Find good specimens of the flowers talked about in this chapter. Draw them as well as you can and colour the drawings as nearly as you can to the colours of the flowers when fresh. Mark by means of arrows the different parts of the flowers in these drawings.

(2) Note in what positions you found the flowers mentioned in this chapter, in what soil they were growing, sand, clay, chalk, etc.

(3) Write out and learn the meanings of the words in the Word List.

(4) Watch the plants of this chapter and note what insects visit the flowers.

(5) Examine, draw, and describe twigs of **BIRCH**, **HAZEL**, and **OAK** as they appear before they start into growth in the spring.

(6) Do you know of any other perennials besides

those mentioned in this chapter? And any more annuals?

(7) Find as many points of likeness between a Lily of the Valley and a Bluebell as you can.

WORD LIST

perennial	2. margin	6. pendent
annual	rosette	alternately
1. corolla	floral	7. monocotyledons
petals	foliage	cladodes
stigma	calyx	pistil
style	sepals	8. dicotyledons
anthers	achene	Labiatae
cross-fertilisation	capsule	nutlets
ovary	cotyledon	9. trefoils
ovules	3. perianth	solitary
pollen	succulent	explosive
peduncle	spathe	mechanism
pedicel	offsets	cleistogamic
footstalk	4. raceme	10. catkins
rootstock	lax	bracts
rhizome	5. texture	nectaries
	crowns	

(Note.—The numbers indicate in which section the words occur.)

II. BANKS AND HEDGES

IN setting out to search the hedgerows, we find it difficult not to notice also the plants that grow alongside, but do not belong properly to the hedges. The upper and middle levels of the banks come within our present range, of course, but the lower parts, if at all moist, as they usually are, will be found occupied by some of the plants of wet ditches, marshes, and riversides—quite a different type of vegetation.

The plants of a windy heath have features very different from those of the waterside. The plants of the seashores, of the chalk hills, of the rich meadows, are also of distinct habit and build. They should all be studied in relation to their surroundings, to which they are fitted, so that they may be able to live under their various circumstances of soil, light, and moisture. Remember two great facts in the life-history of every green plant : (1) it must have *sunlight*, in which it manufactures the bulk of its food out of the air ; and (2) it must have *moisture*, which it sucks up by its roots and breathes out again by the

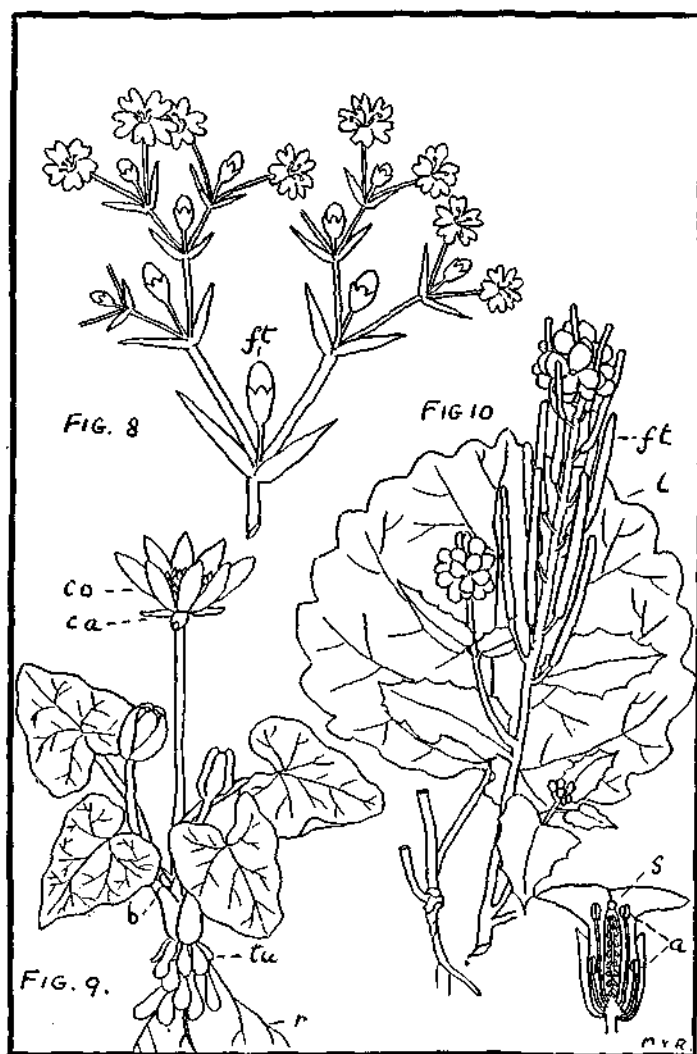
pores in its leaves. Where there is shortage or over-abundance of sunshine or water, the plant is adapted accordingly. Only by bearing these governing facts in mind can the various forms of root, stem, leaf, and flower be properly understood. At the same time, we shall see that most plants are fitted for middling conditions, and will not show the striking features of those existing under extremes.

I. Lesser Celandine (*Ranunculus Ficaria*).

The Lesser Celandine (Fig. 9) must be taken first, for the simple reason that it is the first to appear in the hedgerows, often opening its yellow stars as early as the first week in January, at any rate in the South. This readiness to answer the call of the sun, and the fresh charm of its marbled leaves, have commended it to the poets. Who does not remember Wordsworth's simple ode? :—

Pansies, lilies, kingcups, daisies,
Let them live upon their praises;
Long as there's a sun that sets
Primroses will have their glory;
Long as there are violets
They will have a place in story;
There's a flower that shall be mine,
'Tis the little Celandine.

It is not altogether a hedgerow plant, being



HEDGEROW PLANTS

Fig. 8, Greater Stitchwort; Fig. 9, Lesser Celandine;
 Fig. 10, Garlic Mustard.

often found in corners of fields, waste places, etc., but almost always in moist ground.

Though the make-up of its flowers has given it a place in the Buttercup family, it is in many respects a peculiar plant. We have spoken (I, 3) of the two great divisions in which all flowering plants have been arranged, the one with two seed-leaves, netted veins, and parts of the flower in fours or fives, and the other, with only one seed-leaf, parallel veins, and parts of the flower in threes. This is very nice and clear, but it does not hold good in all cases. Our first great scientific naturalist, the illustrious John Ray, recognised this fact two centuries and a half ago, saying: "Nature refuses to be forced into the fetters of a precise system."

The Lesser Celandine is an instance. It clearly belongs to the Buttercup family, a two seed-leaf, net-veined family, but its calyx or outer cup has usually *three* green sepals, not four or five, and it starts in life with only *one* seed-leaf. There are generally eight narrow, gold-yellow petals, an outer series of three and an inner series of five. There is a small scale-like nectary (honey-cup) at the base of each petal, and as they are easily reached the flower can be fertilised (or, more properly speaking, **pollinated**) by little flies, as well as by the longer-tongued bees and wasps.

In rainy or cloudy weather the flower closes, reminding us of our talk about the Wood-sorrel. The backs of the petals, then seen, are dull and unattractive, there being no present need for the attentions of insects. After pollination the petals bleach, as a notice that insects' visits would be unprofitable to both parties.

The Lesser Celandine likes shady quarters; insects do not; the result is that plants growing in the shade are apt to be short of fertile seeds. To make up for this our Celandine produces little bulbs at the base of the leaves, which fall off and grow into new plants.

On digging up a Celandine plant, we shall see that, besides ordinary fibrous (thread-like) roots, there is a number of swollen, sausage-shaped tuber-roots. These are stored with food, and from them the plant draws much of its nourishment in its early activities. In summer they will be found shrunken and used-up. In autumn a fresh lot is formed.

2. Greater Celandine (*Chelidonium majus*).

The Greater Celandine is not, as one might suppose it to be by its name, a near relation of the Lesser Celandine, but belongs to the *Poppy* family, the flowers of which have four petals, and the seeds are borne together in a

capsule (cup of many seeds), not in a cluster of single seeds, each with its own cover, as with the Lesser Celandine, Anemone, etc. The flowers of the Greater Celandine are ochre-yellow, smaller than in any other of the family, but several are loosely grouped together. The capsule is a long, narrow vessel like that so familiar in the Wallflower, Turnip, etc., and opens from the bottom with two **valves** (doors) in the same way. The leaves are large, thin, broadly divided, and somewhat bluish beneath. The plant grows not only in hedges, but also by old walls and in waste places. The sap is of a rich orange-yellow, which in the old days was supposed to show that it was good for jaundice. It is still believed to cure warts.

3. **Garlic Mustard** (*Sisymbrium Alliaria*).

Garlic Mustard (Fig. 10) is a very common hedge-plant, often appearing in large companies. It is a stiff, upright annual (lasting one year only), averaging 2 feet in height. Quite early in the year the bold, long-stalked young leaves, somewhat circular in outline, with roundish notches, and strongly veined, will be noticed. Then up shoots the stem, clothed with different leaves, being heart-shaped, coarsely toothed, and on shorter stalks. This difference between the upper or

stem-leaves and those at its foot often occurs, and should always be carefully noted, for often it helps us to tell one **species** (kind) from another.

The flowers are in long strings or spikes (properly **racemes**, as each flower is on a foot-stalk, whereas in a true **spike** they are seated right on the stem). The petals are small, white, in number four, not cupped as in the Poppy Family, but flat and *cross-shaped*, hence the name of the Natural Order : *Cruciferae*, cross-bearing. This is a large and important order, which includes the Wallflower and Turnip, referred to above, and the "Stock Gilliflowers" of gardens, all the many mustards, cresses, cabbages, radishes, etc. Many have a characteristic pungent taste, and some a strong and disagreeable smell. Among these last is our plant. The Garlic Mustard smells of garlic when rubbed or bruised. However, it has long been esteemed by country people as a salad plant, and is said to be an excellent vegetable when boiled and eaten with boiled mutton or salt meat.

A feature of the Crucifers is their *six* stamens, of which two have shorter **filaments** (stalks) than the others; another is their seed-pods, opening from the bottom, and divided into two cells by a thin partition, to which the seeds are attached.

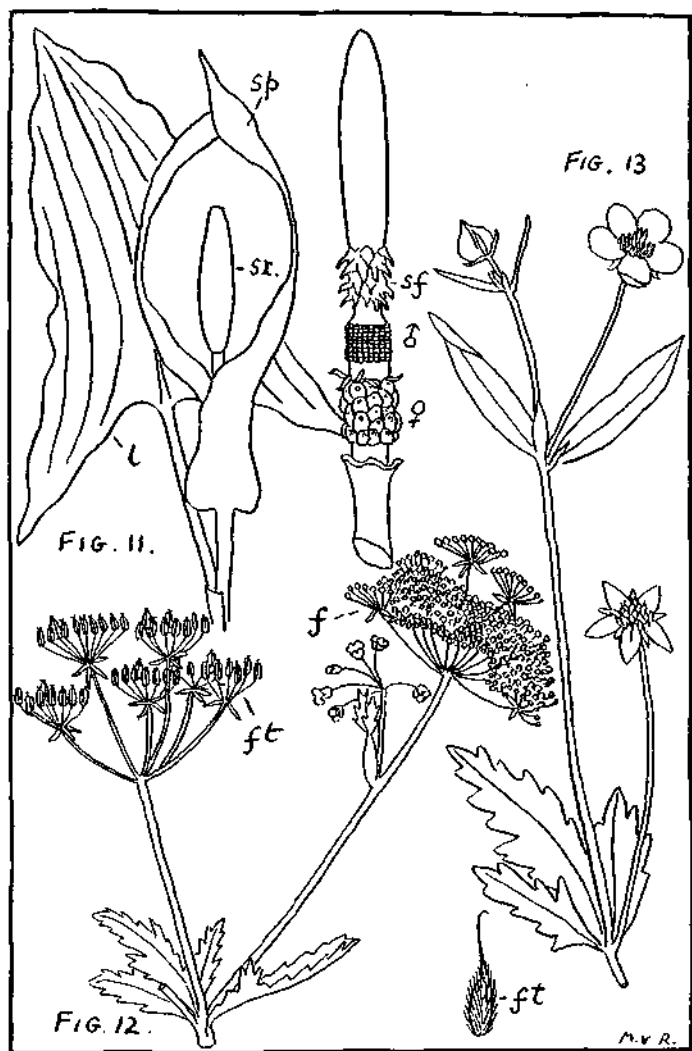
4. Greater Stitchwort (*Stellaria Holostea*).

The Greater Stitchwort (Fig. 8) is, like the Garlic Mustard, one of the earliest of hedge plants; in other respects no two plants could well be more unlike. The flowers of both are white, it is true; but who would think of comparing the snowy, ten-rayed stars of the Stitchwort with the comparatively uninteresting flowers of the other? There is, in my opinion, hardly a rival to the Stitchwort for elegance and beauty in its place and season. Its flowers are so dazzlingly white, so refined in shape, and so lightly yet freely scattered on its slender, blue-green stems and leaves. It is a brittle and delicate thing, and specimens should be gathered with the scissors; handled and arranged carefully, few flowers are prettier. It has a long season, too; the flowers open one after another in their peculiar clusters, which are worth examining. Each stalk ends in a flower after sending out two daughter stalks. These two each end in a flower, and each produces a pair more, and so on. This arrangement is a feature of the *Pink* and *Chickweed* family, to which our plant belongs. It is also known by its leaves being always in pairs, and of undivided outline, appearing at a swollen joint. The flowers have five petals, but they are so deeply cleft

as to look like ten. The Greater Stitchwort is well fitted for hedgerow life; its snaky stems and grassy leaves thread their way through the tangled herbage about them, and reach out to the needful air and light.

5. Barren Strawberry (*Potentilla sterilis*).

The Barren Strawberry begins to adorn the banks and woods in March, whereas the true Wild Strawberry will hardly appear till a couple of months later. They are found in similar situations, the true Strawberry being more of a woodlander perhaps, and the flower-stalks inclined to grow taller and more branched. In leaf and flower they are hardly to be distinguished, save that the Barren Strawberry is usually smaller in the petal. The flowers of both are supported by a double green calyx, the white petals of both are more or less notched; the leaves of both are alike, with three hairy, toothed, strongly veined leaflets, which are silvery when young. But when in fruit the difference is clear. There is nothing attractive about the Barren Strawberry's fruit; it is just a little bunch of dry nutlets, like those of the Buttercup or Anemone. But in the true Strawberry the nutlets are spread over a swollen head that is famous for its fine colour, juiciness, and flavour. In a



MORE HEDGEROW PLANTS

Fig. 11, Cuckoo-pint (sf, sterile florets); Fig. 12, Wild Beaked Parsley; Fig. 13, Common Avens.

botanical sense the "fruit" of the Strawberry is not a fruit at all. The true fruits are the tiny seeds, each in its own cover, the eatable part being only the supporting receptacle, which in the Barren Strawberry, and indeed in nearly all plants, is small, green, comparatively dry, and of course no good to eat. These plants belong to the *Rose* family, as do the Crab Apple, Wild Cherry, Hawthorn, etc.

6. Common Avens (*Geum urbanum*).

The Common Avens (Fig. 13) is another member of the *Rose* family, and its flowers are similar in make-up to those of the Strawberries, but the five little petals are yellow, and are borne on wiry, slightly branching stems of anything between 1 foot and 3 feet high. The chief interest of the plant lies in its fruits or seed-vessels (nutlets) which are similar to those of the Barren Strawberry, but they are covered with silky hairs, and each has a long awn or bristle with a hook at the end, by which the nutlet hooks itself on to passing objects, such as the coats of men and animals, thus carrying them far and wide.

There is quite a large variety of these hooked fruits and seeds. The botanical meaning of the word "fruit", should be clearly under-

stood. A fruit, then, is just the seed with its coverings, whether these be dry or fleshy, eatable, uneatable, or poisonous. Sometimes each seed has a separate covering all to itself, as with the Plum, or our Avens; sometimes there are several or many seeds together in the cover or vessel, as with the Primrose or the Apple.

The hooked awn of the Avens-fruit is formed from the remains of the style, the stalk that leads from the stigma or pollen-catcher to the ovary or seed-box, which in this instance of course holds only one seed. The style, having done its work in fertilising the ovule or infant seed, dries, and the end bends back; then most of this breaks off, leaving enough to make the hook.

The ground-leaves of the Avens are rather large and handsome, divided to the midrib, with a large lobe (rounded division) at the top, and unequal divisions on each side below, all saw-edged. The stem-leaves are smaller, usually in three parts. There are also what are called stipules at the bottom of the leaf-stalks (petioles), a pair of wings or lobes, such as are found in many plants, sometimes broad and leafy, sometimes mere threads, as in the Bramble. The root, which is perennial and sends up growths year after year, has the scent of cloves.

7. Cuckoo-pint (*Arum maculatum*).

The Cuckoo-pint or Wild Arum (Fig. 11) is hardly likely to pass unnoticed by any spring-time wanderer along our hedgerows. The half-dozen large, glossy, triangular, or broad-arrow-shaped leaves are striking enough, and as for the flower, which soon rises on its short, stout stem in their midst, it is quite unlike that of any of our other plants. I suppose there are few of us who have not, at some time or other, observed the large hood, green at first, then yellowish or purplish, with the upright rod, like a thin ninepin, in its centre. This, we used to take for the flower, but the hood (the proper name of which is *spathe*, and the rod *spadix*) is only a thing added to the true flowers, which are simple objects clustered round the lower part of the spadix, and shut in the lower, globe-shaped part of the spathe (which, by the bye, is of the same nature as the sheath we found withering at the base of daffodil flowers (I, 3)). If we strip off the spathe, and expose the spadix, we shall see, first or uppermost, a band of male flowers, each consisting of a single stamen; second, or below, a similar band of female flowers, each of a single ovary with its stigma. These are topped by some imperfect flowers, reduced to hair-like growths.

Now the female flowers ripen before the male flowers, thus preventing self-fertilisation. The Arum is, in fact, fertilised by small flies, which are held inside the globe by the down-pointing hairs (imperfect male flowers) at its neck above, and are almost always found imprisoned here. If the plant is in the earlier or ripened female stage, the flies fertilise them with pollen they have brought in from other flowers; if in the later or male stage, when the pollen is ready, the insects carry it away to other flowers, being let out by the hairs above, now withered.

The leaves, spathe, and spadix soon decay altogether, leaving a head of large scarlet berries, which are *poisonous*. There is a massive root-stock, full of starch, which is the chief foodstuff of plants. It was formerly used for stiffening the ruffs and cuffs worn by ladies and gentlemen in the reign of Queen Elizabeth.

8. Wild Beaked Parsley (*Anthriscus sylvestris*).

The Wild Beaked Parsley (Fig. 12) is another plant that challenges notice by its early foliage, which ornaments the hedges, even when the days are shortest. The leaves of the Wild Beaked Parsley are cut up into many fine divisions, and look very like a fern.

The stems are tall (3 to 4 feet), richly leafy, much branched, and bearing flat heads of many small white flowers; what could be more different from the dwarf, simple, massive growth of the Arum? But our Parsley has its claims, if only as our first example of that large and important family the Umbellifers, so called because they carry their flowers in what botanists call umbels, a word derived from the Latin *umbella*, an umbrella or parasol—an apt comparison, for the little flowers radiate by their own footstalks from a centre, like the ribs of an umbrella.

The group is a terror to the young botanist, as it is difficult to tell the many species one from another, though as a group they are strikingly distinct from all other groups. But this difficulty, like many others in life, disappears if you “put your back into it.” And it is well worth while, for the umbellifers are important plants, being both handsome and useful. Some of them give us valuable foods and relishes, such as the Carrot, Parsnip, Parsley, Carraway, and Celery. Others are deadly poisons, such as the Hemlock and the Dropwort.

The Wild Beaked Parsley may be known from its nearest cousins by its early habit, by the pointed lobes of the leaves, and by its smooth (not ribbed) seed-vessels. It is the most abundant of them all.

EXERCISES

(1) Find good specimens of the flowers described in this chapter. Draw them as well as you can and colour the drawings as nearly as you can to the colours of the flowers when fresh. Mark by means of arrows the different parts of the flowers in these drawings.

(2) Note in what positions you found the flowers mentioned in this chapter, in what soil they were growing, sand, clay, chalk, etc.

(3) Write out and learn the meanings of the words in the Word List.

(4) Watch the plants of this chapter and note what insects visit the flowers.

(5) What plants do you know whose flowers have cross-shaped petals?

(6) Compare your drawing of the flower of the Barren Strawberry with the flowers of a Crab-apple and a Hawthorn.

WORD LIST

1. nectary	valves	6. awn	petiole
pollinated	3. species	style	7. spathe
fibrous	raceme	ovule	spadix
tuber	spike	lobe	8. umbels
2. capsule	filaments	stipule	

III. FIELDS, PASTURES, AND MEADOWS

OUR present scene of operations is a good big one, for we have in view grassland both wet and dry. Perhaps the meadow is sloping and the upper levels are stony or gravelly. These let the rain water through quickly. Lower down the soil is clayey or "holding," and at the bottom the ground is swampy, with a little watercourse trickling through it. Or if the field is flat as a whole, there may be sunken places, where it is always more or less wet.

1. Marsh Marigold (*Caltha palustris*).

Hardly any wet or swampy spot is without this showy flower, which is one of the first to tell us spring has come. It belongs to the Buttercup family, but differs from the buttercups themselves in having no corolla, and in bearing its seeds in a cluster of pods called **follicles**, not each in its own case (achenes). The large, glossy, rich-yellow cup is the calyx, which in the Buttercup and most other flowers

is green, as we have already seen (as it is in the Marsh Marigold while in bud), and the five divisions are sepals, not petals. The corolla is absent, as it is in its near relation the Wood Anemone. The stem is only slightly branched, and at each joint there is a stalkless leaf, which embraces the joint with its cut-out base. The ground-leaves are held up by rather long stalks, which spread out into a sort of sheath at the bottom. All the leaves are leathery, smooth (that is, without hairs), dark green, and edged with rounded scollops.

2. Buttercups (*Ranunculus acer*, *R. bulbosus*,
R. repens).

Buttercups form the central group of the Family or Order named after them. This order is usually taken first by the student, because all parts of the flower are present, separate and distinct from one another. We have already seen that in the Marsh Marigold and the Wood Anemone there is no corolla; in the Primrose and the Bugle the petals are united; in the Daffodil the calyx and corolla are joined together, and so on. Nothing of this sort occurs in the Buttercup, and as the meadows, pastures, and waste places are now golden with them, we will look a little closely into their make-up.

(1) Outermost or lowermost are the five yellowish-green, concave, rather pointed sepals forming the calyx, the outer coat of the flower.

(2) Now comes the brilliant yellow corolla, composed of five petals, heart-shaped, stuck in by the pointed ends, the broad, nicked ends being at the outside. At the inner, pointed end of each there is a thickened, hollow spot. This is the nectary or honey-cup.

(3) Inside the set of petals—that is to say, the corolla—is a thick circle of many stamens, and in the centre of all the cluster of ovaries, each with a single seedlet and a single stigma on a short, thick, hollow stalk or style.

Note that the stamens, and of course the petals and sepals, are inserted below the ovaries. This feature makes the great difference between the Buttercup family and the Rose family, to which the Strawberry, Avens, and Cherry belong.

The flower is open to all kinds of insects, which visit it for its pollen as well as for the honey. The outer stamens shed their pollen (to be carried by insects to other flowers) while the stigmas are still covered by the inner, unripe ones, but there is a stage when self-pollination is possible, from the innermost stamens touching the stigmas, or by small insects crawling over the flowers.

In moist or rich ground the Meadow or Upright Buttercup (*Ranunculus acer*) (Fig. 14) will often grow 3 feet high, and then, with its deeply-cut foliage, the leaves five-sided or rounded in outline, but reduced upwards to a few narrow lobes, it is a decidedly handsome plant. The stems, which, like the leaves, are softly hairy, branch rather freely, the flowers appearing in loose, upright clusters. Cattle do not like it, as it burns their mouths and throats.

There are two other buttercups that are very like the Meadow Buttercup, namely, the Bulbous Buttercup (*R. bulbosus*) (Fig. 15) and the Creeping Buttercup (*R. repens*) (Fig. 16), but they have distinct features. The Bulbous Buttercup will be known at once by the sepals, which, instead of being cupped and supporting the petals, as in the other kinds, turn down and embrace the stem, which is furrowed, not smoothly round, as in the Upright. But the thickened rootstock, like a little turnip, is its great feature. It lives in drier places than the Upright, and this "bulb" enables it to hold on in drought; it puts by, not for a rainy, but for a dry day.

The Creeping Buttercup, on the other hand, is a lover of moist quarters—ditches, wet waysides, and the like. It is a low grower, its leaves are three-sided, often with whitish



BUTTERCUPS

Fig. 14, Meadow Buttercup; Fig. 15, Bulbous Buttercup;
Fig. 16, Creeping Buttercup.

blotches, and, above all, it spreads by means of runners, like the Strawberry, which renders it a troublesome weed in gardens.

3. **Early Purple Orchis** (*Orchis mascula*).

This very interesting plant (frontispiece) grows over 1 foot high in sheltered and moist meadows, while on exposed downs its height is often only a few inches. The flowers, usually of a rich reddish-purple, but sometimes pale, form a loose spike. Carefully examined, they show some strange features. There are three sepals, the central or topmost one arching with the two upper petals to form a hood, and the two other sepals next below, one on each side, spread out. But the remaining petal has undergone a great change. It occupies the whole lower part of the flower, in the form of a three-cleft lip, spotted in the middle, and with a curved spur behind.

Now look inside. The first thing we shall notice are two upright, greenish, club-shaped masses of pollen, with a splitting cover, and a sticky foot. These form a sort of anther, and are called **pollinia**. The stigma is like a knob, placed below and in front of the pollinia. When a humble-bee visits the flower, it thrusts its head against the foot, and brings away the pollinia on its head. They soon change

their position from the upright and come forward, so that they, or one of them, touches the stigma of the next flower visited. This behaviour of the pollinia may be shown by pushing in a pencil, which will come out with the pair of pollinia sticking to it, and turn forward, as just said. The whole action is considered to be the most perfect arrangement for cross-pollination known.

The flower of the Orchis is fastened to the stem by a long, twisted thing that looks like a foot-stalk, but is not; it is the ovary. The seeds are very many and very small. The leaves are like those of the Bluebell, but shorter, and often spotted or blotched. Both, having leaves with parallel veins and flowers in threes, belong, of course, to the monocotyledons or one-seed-leaf group.

If we dig up a plant we shall find a few thickish roots, and a roundish tuber, which is a root swollen for storing food, formed last year and sending up this year's flowering stem. By the side of it is this year's tuber, at the top of which appears, or will appear, a bud to form next year's stem.

4. Yellow Flag (*Iris Pseudacorus*).

The Yellow Flag, or Iris, that great ornament of the marshlands, shall be noticed next,

if only for its relationship to the Orchis. Its large blossoms do not seem, at first glance, to have much in common with the lipped flowers we have been considering. They are as regular as the others are irregular. Their parts are clearly in *threes*, while in the Orchis this is rather difficult to make out, though quite as true. Still the Iris has its own stock of peculiarities.

When we were examining other "monocots"—short for *monocotyledons*—such as the Bluebell and the Daffodil, we saw that the flower was made up of a perianth of six more or less deep divisions, three being sepals and three petals. Now in the Iris the three outer divisions, which are the sepals, known to gardeners as "falls," turn outwards and downwards in three different directions, giving the Iris flower its special appearance. The three inner divisions, or "standards" (petals), are much smaller, and upright. Between the inner and the outer divisions are the stigmas, which are like no stigmas we have yet seen, having a broad wing that makes them look like extra petals, each arching over a large, dark anther, which is thus right above its corresponding fall.

There are usually two or three flowers on a stiff, round stem, each coming out from a sheathing bract or short leaf. The lower

leaves are often taller than the flower-stems, sometimes 3 feet high, of a pale bluish-green, sword-shaped, and stiffly upright. There is a stout, running underground stem (**rhizome**) from which many roots go down.

5. **Lady's Smock** (*Cardamine pratensis*).

Of all our wild flowers belonging to the Crucifer family (II, 3) the Lady's Smock or Cuckoo Flower is the prettiest. The flowers of crucifers are mostly *yellow* like the Wall-flower or the Charlock, or *white*, like the Garlic Mustard, and have little beauty. But the soft mauve of the Lady's Smock is charming, and "paints the meadows with delight" as Shakespeare sang, calling it "Lady-smocks all silver white," which in some districts it is.

Its leaves are pretty too, being good examples of what botanists know as **pinnate** (winged) leaves. The midrib of the lower ones have from three to six pairs of roundish leaflets along the sides, and a large one at the end. These lie on the ground all round the flower-stem, and have the uncommon power of rooting and forming buds, from which, when the leaf decays, new plants arise.

The Lady's Smock also increases freely by offsets or short runners, as do so many perennial

plants. The upper leaves have narrower leaflets. Like many of its kind, it has a sharp taste, and in old days was used in salads.

The name Lady's Smock or Lady-smock came, no doubt, from Our Lady, the Virgin Mary, after whom, in old times, many favourite flowers were named. Cuckoo-flower, like Cuckoo-pint, is because it opens at the time when the Cuckoo comes.

6. Cowslip (*Primula veris*).

The Cowslip, which is loved almost as much as its relation, the Primrose, generally shuns the woods, being a plant of the open meadows. It comes into flower later. This and other differences between them, such as its smaller, yellower, drooping blossoms, lifted up in a cluster (umbel) on a tall stem (peduncle), are, as Culpepper, the old herb-doctor would say, "so well known that it is needless to describe them as to tell a Man he has gotten a Head." The leaves, it should be noticed, have shorter blades than the Primrose, and they narrow suddenly below, with a longer, flattish stalk.

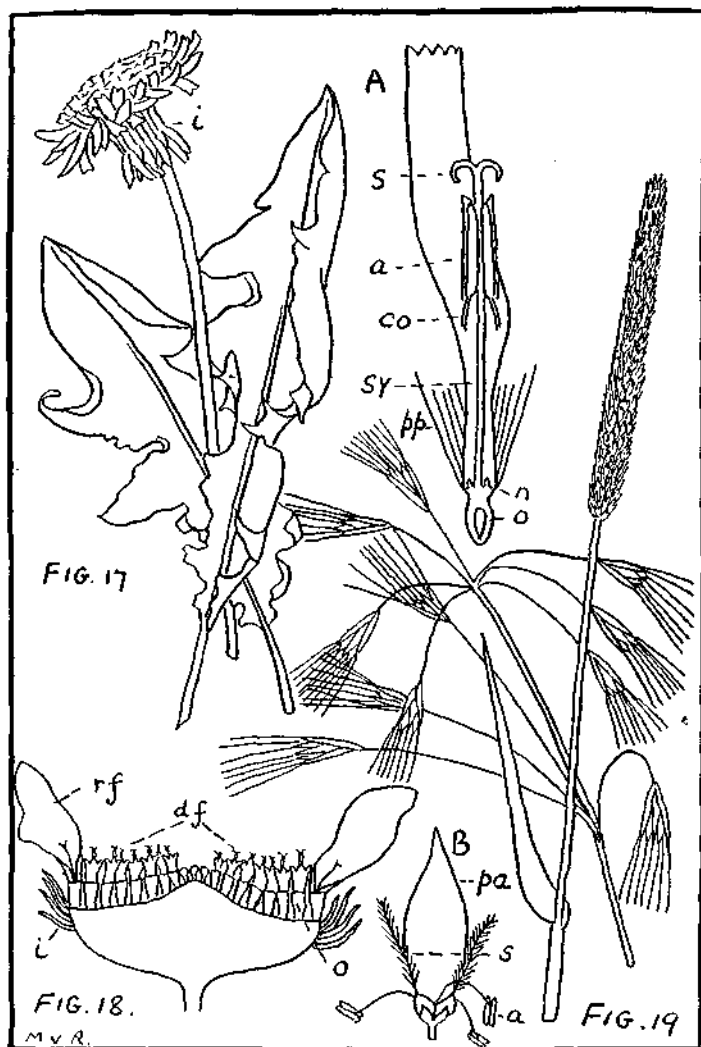
7. Dandelion (*Taraxacum vulgare*).

The Dandelion (Fig. 17) is usually despised as a common weed, or disliked as a trouble-

some one, and it is certainly both. Yet it will be found worth attention, both for its beauty, its usefulness, and its botanical interest. Let us take the botany of the Dandelion first.

It is a good example of the great family or order to which it belongs, the *Compositæ*, the largest order in the world, with 11,000 species, of which 235 are found in Britain. On account of the very special outfit of the flower, which has won it this success, the Composite Order is held to be the "latest thing" in plant-life, and in the most up-to-date arrangement of plants (though not in the books in common use) it is placed last, or highest.

The first thing to be learnt about the Dandelion flower is that it is not a flower, but a head of flowers, a sort of crowded umbel (which we described in the case of the Wild Beaked Parsley (II, 8)). This flat head is made up of many little flowers, called **florets**, closely pressed together, side by side. The head is kept together by what we call an **involucre**, which acts the part of a calyx in an ordinary flower. It is made up of a number of scales or **bracts**. Various patterns of involucre are found in other composite flowers. In the Dandelion the inner scales are closely packed round the head, and the outer ones turn back.



FLOWERS OF THE FIELD

Fig. 17, Dandelion (A, floret); Fig. 18, Daisy (section); Fig. 19, Two Grasses (B, floret, flowering glume removed).

Break open a head, or cut it down through the middle, and examine it carefully. Pick out a floret. At the bottom is the oblong ovary. Above it is a sort of joint, carrying a circle of bristles, coming from the middle of which is the little yellow corolla. It is a tube, with a comparatively large, five-pointed strap sticking up from one side of it. Inside the tube will be seen *five* stamens, their filaments or stalks supporting as many long yellow anthers, fastened together at their edges to form an inner tube. Up the middle of this tube rises the style. When the pollen is shed into the anther-tube, the style, topped by its pair of tongue-like stigmas closely pressed together, grows up, and by so doing pushes the pollen out at the top, the pollen-grains clinging in a cluster to the under or wrong side of the stigmas. These now spread out widely, ready to receive pollen brought to them by insects from other florets. But if none comes the tips curl backwards (looking like ram's-horns) and so dip the upper or acting side of the stigmas among the grains. The floret thus pollinates itself.*

Of late years a strange discovery has been made. Many Dandelions have been found to have no pollen. In others there is pollen, but

* See *Life Histories of Common Plants*, by F. Cavers, D.Sc. (Clive).

it has no power to fertilise the ovules, which, however, still grow into fresh plants.

When the fruit is ripe, the corolla falls off, the joint above it lengthens, the bristles spread out like a parachute (**pappus**), and the fruit (achene, one-seeded) floats away on the breeze.

The flower-head closes at night and in damp weather, and opens only for about eight hours on fine days. The florets open one after another, beginning on the outside.

The rosette of several layers of evergreen leaves are so arranged as to shade one another as little as possible. We know how important is sunlight to the health of plants. This **leaf-mosaic**, as it is called, is seen in many other plants.

The fleshy "tap" root is able, if its top is cut off, to form buds, and start fresh rosettes. This is good for the plant, but bad for the farmer. These roots, on the other hand, are useful in medicine, and make good coffee.

8. The Daisy (*Bellis perennis*).

The flowers of the Daisy (Fig. 18) belong to another division of the Composite Family, with the Mayweed, Camomile, Ox-eye, Ragwort, and the giant Sunflower of our gardens. It is very different from the Dandelion in one way: the straps, which are carried by all the

florets of the Dandelion, are in the Daisy only on the outer row, making a ring or border round the head. They are white, often tipped with pink or crimson. They are a little wider upwards, with a slight dent in the middle. They are called **ray-florets**, and have no stamens. All the other florets are without rays and have both pistil and stamens. These are known as **disc-florets**. None has the feathery parachute, which we named pappus. But the Daisy multiplies without this help. It ripens plenty of seeds which soon sprout, and besides, the plants spread quickly by means of **offsets** or short runners, which make flat, unwelcome patches on lawns. The Daisy, however, has always been a great favourite. Everyone, from the child just able to talk, to the great poets, whose words are repeated all over the world, praises it.

9. Grasses.

To leave the grasslands without a glance at the Grasses (Fig. 19) would be a gross insult to the most important family of plants in the world. It has been said with truth that "Considering their multifarious uses as fodder and food, for brewing, weaving, building, and a thousand other purposes, it is not too much to say if every other kind of plant were dis-

placed by Grasses, man would still be able to supply his chief needs from them." Without them we should not only be without bread, but also without meat. From wheat, which is a grass, we get bread; from cattle, which eat grass, we get meat.

In number of species the Grasses come next after the Composites, Orchids, and the Pea family, but it is their ability to live in crowds that gives them their great advantage. Their habit of growth fits them for almost all soils and situations.

Though botanically allied to the Lilies, grass-flowers are very different, very peculiar, and at the same time very simple. Instead of a coloured star or tube, the flower is made up of merely two or three chaffy, boat-shaped scales, called **glumes** (sometimes **paleas**), shutting on each other like the beak of a bird. They hold the ovary with its pair of stigmas like bottle-brushes, and the (usually) three large anthers, swinging freely on their long filaments. They are, of course, wind-pollinated.

In the arrangement of the flowers on their stems, Grasses are very different from one another. Some are loose and spreading, like the Brome-grasses, and some are crowded in a close rod or **spike**, like the Fox-tails and the Rye-grasses. But there are few that are not ornamental.

EXERCISES

(1) Find good specimens of the flowers described in this chapter. Draw them as well as you can and colour the drawings as nearly as you can to the colours of the flowers when fresh. Mark by means of arrows the different parts of the flowers in these drawings.

(2) Note in what positions you found the flowers mentioned in this chapter, in what soil they were growing, sand, clay, chalk, etc.

(3) Write out and learn the meanings of the words in the Word List.

(4) Watch the plants of this chapter and note what insects visit the flowers.

(5) Show by means of diagrams the chief difference between the flowers of the Rose family and the Buttercups.

(6) Try to find a bee with pollinia on its head.

(7) How is a Dandelion "clock" formed from a flower?

(8) Why do we find grass almost everywhere?

WORD LIST

1. follicles	5. pinnate	pappus	9. glumes
3. pollinia	7. composite	leaf mosaic	paleas
tuber	floret	taproot	spike
4. bract	ligule	8. ray florets	
rhizome	involucre	disc florets	

IV. POOLS AND STREAMS

JUST as in the meadows we find plants that live in the dry parts and others that thrive in the wet parts, so there are water-plants that live entirely in the water or on the water, and others that only dip their roots in water, besides those that belong to the marshes, which are only extremely watery meadows.

The first thing that strikes us about a true water-plant is its tenderness. It feels soft in the hand, and is easily broken and damaged. In the dark one could tell the Marsh Bedstraw from the Hedge Bedstraw—the last-named is so much harder and firmer to the touch. When water-plants have upright and fairly firm stems, they will be found to be spongy. The more they live in the water, the spongier they are. Land plants, in order to stand the strain of wind, or even their own weight, have to be made strong by stringy and tough stuff, which is not found, or only slightly, in water-plants. The sponginess of the stems is due to a number of large spaces and passages, which carry air to the lower parts of the plant, under

water, where they could not otherwise get it. Other features of water-plants will be noticed as we go along.

1. **Water Crowfoot** (*Ranunculus aquatilis*).

One of the prettiest ornaments of our streams, pools, and watery ditches is the Water Crowfoot or Water Buttercup (Fig. 22), when it spreads its sheets of pure white, yellow-centred flowers, and glistening floating leaves in the spring and summer sun. It is not only a pleasure to look at, but also a curious study, on account of its two sorts of leaves. The leaves at the tops of the shoots, which float on the water, are roundish, with *three* or *five* nicks in the edge. But the lower leaves, usually under water, are just clusters or tassels of threads, through which water easily passes. Sometimes, especially in fast-flowing streams, there are only these thread-like leaves. They are very weak, and, when taken out of the water, which supports them, they become flabby, and shrink together.

2. **White Water-lily** (*Nymphaea alba*).

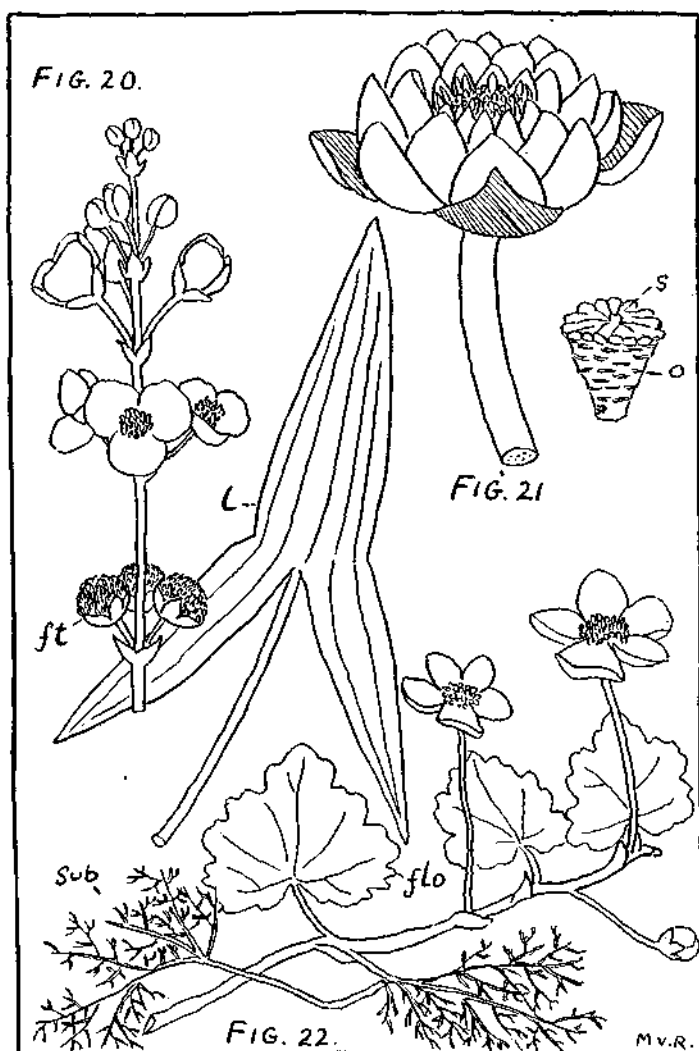
If the Water Crowfoot is the most ornamental of our water-plants in the mass, the White Water-lily (Fig. 21) is the most hand-

some taken singly. Indeed, there is none of our wild plants that is more striking, either in flower or leaf. Here again there is something to think about as well as to admire. The White Water-lily is one of Nature's own "double" flowers, for the sepals gradually change into petals, and the petals into stamens. The sepals which stay sepals, green outside, are usually *four*. The white petals and the yellow stamens are *many*.

The flowers of the White Water-lily come singly, resting on the water. So do the very large, roundish leaves, heart-shaped at the base, where the stems are. They rise from rootstocks fixed at the bottom of the water. This fixing is all that the roots of water-plants are good for. Most of the food usually supplied by roots they get through their stems and leaves out of the water itself. The smooth flower-stems are round, but the leaf-stalks are rather three-sided. If a cut end is looked at it will be found to be a mass of pipes.

3. Yellow Water-lily (*Nuphar lutea*).

This is generally commoner than the White Water-lily, and not nearly so handsome. The flowers are smaller, more cupped, and stand up some way out of the water. They have a



WATER PLANTS

Fig. 20, Arrowhead; Fig. 21, Water-lily; Fig. 22, Water Crowfoot (flo, floating leaves; sub, submerged leaves).

smell sometimes like brandy, sometimes like linseed oil, while those of the White are without any scent. The leaves are more oval.

If we look more closely, we shall see *five or more* curved yellow sepals, which are green at the base. Within them there is a circle of dark-yellow, small, narrow petals, numbering thirteen or more. Within the petals, again, there is a thick ring of many stamens curving outwards, the filaments or stalks being broad for filaments, just as the stamens are narrow for stamens. In the centre rises the green, thick, flask-shaped ovary, which spreads at the top into a disc, low in the middle, so as to be rather trumpet-shaped. On the disc are the stigmas, spreading from the centre like the spokes of a wheel. The ovary stands up more than in the White, in which it is sunk in the receptacle (support). Otherwise, the arrangement is much the same, and reminds us of the Poppies, to which these "lilies" are related (and not at all to the true lilies).

4. Arrowhead (*Sagittaria sagittifolia*).

The Arrowhead (Fig. 20) has a much greater right to be called water-lily than the two plants that are so called, for it has parallel veins and flowers with parts in threes. The

perianth has *three* small outer divisions, which are green, like ordinary sepals, and *three* much larger inner ones, which are white. These flowers are in tiers of *three*, on upright stems standing 8 or 9 inches out of the water. The lower ones bear the pistils (and afterwards, of course, the seeds) in a ball. The upper flowers have only stamens, and accordingly no seeds.

The leaves, which also stand out, are very striking, and quite different from those of any other plant. They are made up of three long, pointed parts, one in front and two behind. In fact, they are exactly like an arrowhead with unusually long barbs, so the plant is well named. But it often bears others, floating or under water, and very various in shape. Those deepest under water are long, narrow, and like ribbons, the same width all along. Then come some with the lower part shrunk into a three-sided stalk, ending in a ribbon, sometimes 4 inches long, sometimes twice or three times as much. Then we have some with a lance-shaped blade, more than twice as wide as the stalk, but tapering at each end. Then come some with the blades more or less heart-shaped at the lower end. Then we see a number of leaves with these lobes getting longer and sharper, till we come to the full-formed arrowhead. It is all a question of

place in the water; the ribbon *under* it, the spreading forms floating *on* it, and at last the true arrowhead held *out of* it.

5. **Water Plantain** (*Alisma Plantago-aquatica*).

The flowers of this plant, which is very common in pools, watery ditches, and borders of streams, are like those of the Arrowhead, but very much smaller. They are pinkish, and borne in a large spreading panicle (a loose cluster of flowers), the branches, which are unequal in length, being in tiers. It often stands 3 feet out of the water, and it is then quite a showy plant, though only some of the flowers are open at the same time. The leaves, which spring direct from the rootstock, like the Arrowhead in this also, stand well above the water. They are of a pointed oval shape, like those of that common wayside weed, the Greater Plantain, but very much larger. The plant is often seen in very shallow water. It is, indeed, rather a ditch plant than a true water plant.

6. **Branched Bur-reed** (*Sparganium ramosum*).

This is often found in great crowds, filling wet ditches and fringing streams. It is a rather near relation of the Arrowhead and the

Water Plantain, but it is not at all showy, for it has no flowers in the ordinary sense of the word. It bears balls of pistils and stamens separately, like the Arrowhead, the stamens above, and the pistils below. A close examination will show that the stamens are mixed with very small, dark-coloured scales, and in the lower, or "female," heads the pistils are each surrounded by three to six scales, forming a kind of irregular, uncoloured perianth. The long, thin points of the stigmas jut out. As the large seeds form, the heads, which were about the size of marbles, swell till they become as big as small apples, gradually turning brown. The male or barren ones, which are hardly bigger than peas, wither away after a little while. The flowering stem is branched, with several heads on each branch, and a long, sheathing bract (special leaf) under each of the lower ones. The stem itself is a good deal shorter than the leaves, which are narrow, light-green, and keeled. There is a smaller kind, with no branches, which is found now and then in some districts.

7. Reed-mace (*Typha latifolia*).

The Reed-mace (Fig. 25) is commonly but wrongly called the Bulrush. The true Bul-

rush is a much more slender plant, with a clustered head of flowers, and belongs to the sedges, while our plant is a near relation of the Bur-reed, and bears its flowers in a dense spike or rod, as is well known. It is a favourite for decorating rooms and is freely gathered for this purpose both by hawkers and private people.

Throwing up its dark green leaves 3 or 4 feet, and its flower-stems 6 feet and more, the Reed-mace is a stately object. It does not so much favour the banks as the centres of dykes and pools. It is like the Arrowhead and the water-lilies in this respect, and so often escapes the collector.

The flowers, as we have already said, form a dense spike, often more than a foot in length. The upper, "male," portion is rather the thicker when in bloom, and is yellow, with the multitude of crowded, thin anthers. The lower or "female" is as closely packed, with numerous tiny ovaries tapering into slender styles, and surrounded with tufts of soft hairs, which are brown at the tips, and silvery-white below. When in fruit the upper part is a bare stalk, the anthers having fallen, while the lower part has grown thicker through the swelling of the fruits (achenes or nutlets) still wrapped in the rusty down. When the fruit is ripe, these downy tufts loosen their hold, and

gradually fly off, scattering the seeds far and wide. Like the Bur-reed, and unlike the Arrowhead and the Water Plantain, the Reed-mace is wind-pollinated.

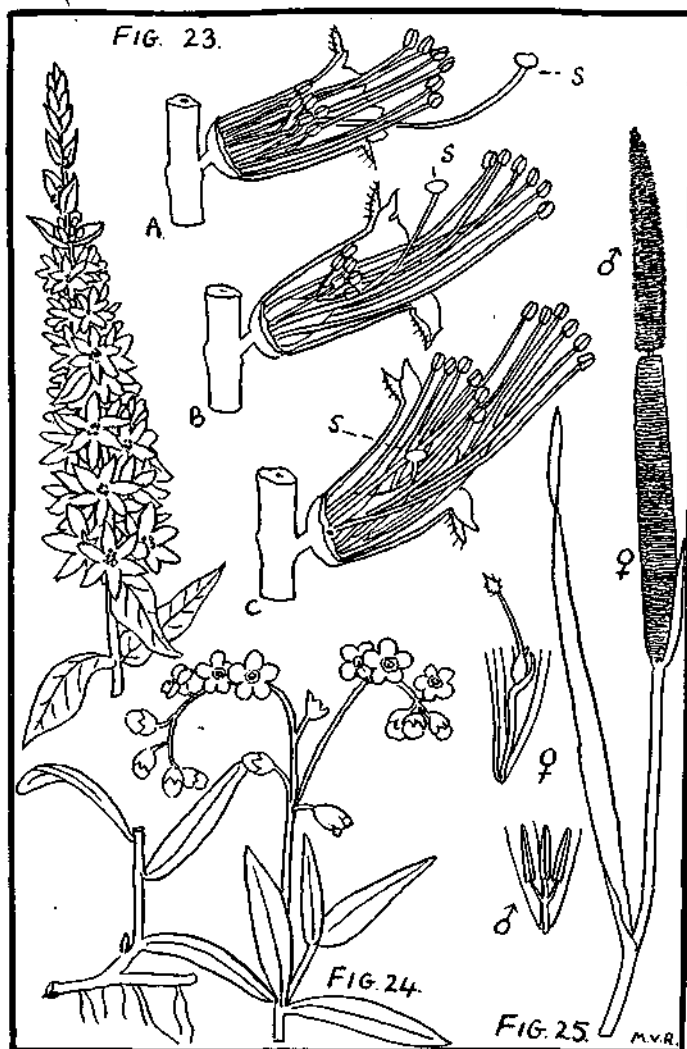
The last four are all "monocots."

8. Forget-me-not (*Myosotis palustris*).

There is no colour in Nature more lovely than the clear blue—the very colour of the spring-time sky—of the Forget-me-not (Fig. 24) when it begins to bloom in the "merry month of May."

It belongs to the **Borage** family, which have the corolla in one piece, usually funnel- or tube-shaped, with teeth or scales at the mouth of the tube. These teeth hide the honey and make the entrance narrow, so that insects must go one way in. They form the "eye" of the Forget-me-not.

The young flowers are often pink, turning blue as they become older. This is said to be a reminder that long, long ago there were no blue flowers. Red and pink came earlier than blue, they tell us, and yellow first of all. There is a near relation of the Forget-me-not, the little Yellow and Blue Scorpion-grass, which shows all three colours. The name Scorpion-grass (which is also sometimes given to the Forget-me-not) comes from the peculiar way



WATERSIDE PLANTS

Fig. 23, Purple Loosestrife (A, long-styled flower; B, mid-styled; C, short-styled) (front part of corolla removed); Fig. 24, Forget-me-not; Fig. 25, Reed-mace.

in which the flowers of the family are arranged on the stem. There is a pair of coils, uncoiling as the flowers open, so that the newly-open ones always face in the same direction. The coils are like the tails of scorpions.

9. **Water Cress** (*Nasturtium officinale*).

The Forget-me-not is sought for its beauty, the Water Cress for its use. We make posies of the one, and munch the other with bread and butter. It seems funny to speak of the Water Cress as a wild flower. Some people are surprised to find that it bears a flower at all. Flowers it does bear and over a long season, but it cannot be claimed that they are pretty. The Water Cress is a crucifer, and its blossoms are like those of the Garlic Mustard (II, 3). They are small, white, and four-petalled. They start in a sort of flat head, which lengthens in time and becomes a long raceme, the lower part with long seed-vessels which stand out nearly at right angles from the stem.

The Water Cress is the true *Nasturtium*, while the gay garden flower called *Nasturtium* is properly a *Tropæolum*.

The plant has much the same habit as the Forget-me-not. It is dwarf and upright in shallow water and bare, wet places, but trailing

for a couple of feet or more by crowded banks of streams and pools, only the ends of the branches being upright.

10. **Purple Loosestrife** (*Lythrum Salicaria*).

There is nothing on the river-sides more noticeable than the rosy-purple spires of the Loosestrife (Fig. 23). The flowers have no stalks. They are set thickly on the four- or five-sided stems, making a spike often 18 inches long, though sometimes a good deal less. The whole plant varies in height from 2 to 3 feet, or even more. In strong plants smaller spikes will spring from the bottom of the main one, as with the Foxglove. The leaves are in pairs or threes, narrow and even-edged, becoming smaller when mixed with the flowers.

The brightly-coloured corolla is made up of six separate oblong petals, on a calyx with six long, awl-shaped teeth, and six short and broad ones.

It is, notwithstanding, a dicotyledon. The flower is showy, but it is when we examine the pistil and stamens that we come to the peculiar interest of the Purple Loosestrife.

We know the two kinds of Primrose, one with stigma standing up and anthers below, and the other with anthers showing and stigma

below. We saw that the difference came from the different lengths of the style and the positions of the filament. But in the Loose-strife there are not only two, but *three* forms. Every flower has twelve stamens in two sets of different lengths, and the single style, again, is of a different length from any of the stamens. It works out like this: (1) long style (stigma prominent), mid stamens, short stamens; (2) long stamens (anthers prominent), mid style, short stamens; (3) long stamens, mid stamens, short style. Insects have a habit of visiting these flowers in the same way and to the same depth, so that flowers will be pollinated from those of another plant, for the different forms are in different plants.

II. Meadowsweet (*Spiræa Ulmaria*).

One of the commonest and at the same time loveliest and most admired flowers of our river-sides, marshes, and damp meadows is the Meadowsweet, whose broad, creamy-white, scented plumes will often be seen in summer and early autumn by hundreds. The wiry, angled, reddish stem bears a flattish head of flowers something like an umbel (II, 8). But the footstalks do not all start from the same point, and, as they end on much of a level, they are of course of different

lengths. This kind of cluster is called a **corymb**. But the flower-head does not end here. From the foot of the corymb rise a couple of daughter corymbs, and often from their bases more corymbs. This is the arrangement we saw in the Stitchwort, but there we were dealing with single flowers, not clusters. This arrangement of flowers is called a **cyme**, and in the Meadowsweet we have a **corymbose cyme**.

The leaves of the Meadowsweet are large, and pinnate (III, 5) with five to nine rather oval or long leaflets. They are wrinkled, soft, irregularly toothed, and whitish beneath. The end division is deeply cut into three. There are also several smaller leaflets along the main leaf-stalk, and a pair of stipules (II, 6) at the base. The seed-vessels are capsules, very small, and twisted.

EXERCISES

(1) Find good specimens of the flowers described in this chapter. Draw them as well as you can and colour the drawings as nearly as you can to the colours of the flowers when fresh. Mark by means of arrows the different parts of the flowers in these drawings.

(2) Note in what positions you found the flowers mentioned in this chapter, in what soil they were growing, sand, clay, chalk, etc.

(3) Write out and learn the meanings of the words in the Word List.

(4) Watch the plants of this chapter and note what insects visit the flowers.

(5) In what ways are water-plants different from most other plants?

(6) What resemblance is there between the Water Cress and the Garlic Mustard?

(7) Draw diagrams showing the three forms of the Purple Loosestrife.

WORD LIST

5. panicle 11. corymb cyme corymbose cyme

V. HEATHS, BOGS, BOG-POOLS

WE have seen that there are dry pastures and wet, and that the wet pastures are sometimes so wet as to become marshes, in which are often streams and ponds. It is the same with the heathland. There are dry heaths and wet heaths, and on the lower levels bogs and bog-pools. But there is this great difference between the two: marshes are full of plant-food, but bogs are not, and the plants that flourish in marshes are seldom seen in bogs.

On the upper or dry heathlands the soil is a black or dark-coloured peat over gravel. Rain passes through it quickly, or is soon dried up by the sunshine and wind to which such land is exposed. The plants which grow on heaths are therefore what are called **Drought-plants**, which can do without water for a time.

How do they manage this? The answer is, By having very small leaves and wiry stems, and by their low growths. It is by the breathing pores (**stomata**) chiefly in the leaves,

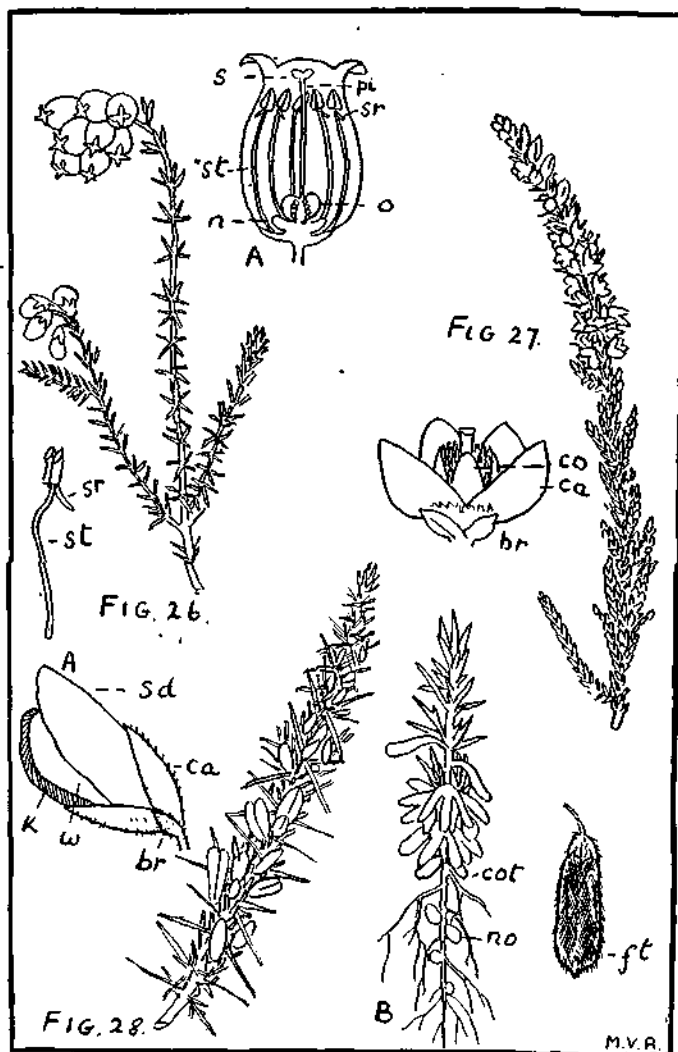
that the water, sucked up by the roots, is breathed into the air, so the smaller the leaves the fewer the pores, and the slower the **transpiration** (the breathing out of moisture: perspiration) and the smaller the call on the supply of water.

Now look at the leaves of any of our three common heaths. They are not only very small, but are also rolled up, so that the under-side (where the pores are that let out the water-vapour) forms a tube which is open to the air only by a narrow slit. On the edges of the slit is a fringe of hairs which hinders still more the escape of moisture.

1. Ling (*Calluna vulgaris*).

In the Ling or Common Heather (Fig. 27) the leaves are very short indeed, and are in crossed pairs forming *four* rows on the crowded branches. The leaves overlap each other, and are shaped rather like spear-heads. They are covered, often thickly, with fine white hairs. The rosy, cup-shaped flowers are small, and massed in dense spikes at the ends of branches. Both corolla and calyx are rosy, so that the flower of the Ling seems double, one in the other, especially as there are four bracts outside both, looking like an ordinary calyx.

The *eight* stamens have peculiar things like



HEATH PLANTS

Fig. 26, Cross-leaved Heath (A, section of flower); Fig. 27, Ling; Fig. 28, Furze (A, flower; *st*, standard; *w*, wing; *k*, keel; B, seedling, showing transition from leaves to spines; *cot*, cotyledons; *no*, nodules).

short horns growing out of them on their outer side, and there are two pores by which the anthers open out at the top. A bee entering the slightly drooping flower rubs against the stigma, and then, in pushing up its tongue for the honey, comes against the anther-horns, and shakes the anthers, bringing a shower of pollen down on its head. The fruit, a capsule (a dry seed-vessel), is covered by the corolla, and fades to a brown colour. It ripens in autumn, and the following spring opens by four slits. The seeds are very light, and are scattered by the wind.

2. Fine-leaved Heath (*Erica cinerea*).

This Heath is well named, for the leaves are more than twice as long as those of the Ling, and thinner. They are deep green. (All the heaths are evergreen shrubs.) They are arranged in tiers of *three*, sometimes four, and are not so crowded on the stem. The flowers are also farther apart, and larger than those of the Ling. They look like little drooping bells (the plant is often called Bell Heather), rather narrow at the mouth, of a brilliant reddish-purple, which is intensely rich in the mass. The sepals are green, long, and narrow.

3. Cross-leaved Heath (*Erica Tetralix*).

The Cross-leaved Heath (Fig. 26) does not, as a rule, grow so tall as the Fine-leaved, and is scarcer. It does not grow in such large masses, but is generally found dotted about the heathlands, here and there, singly or in small groups, seeming, like the Ling, to prefer the moister parts. Still, it is a true drought-plant, though the leaves are not so closely rolled as those of the others. The water in peat-earth is full of acid, which makes it bad for plants, and they therefore use as little of it as possible. Even bog-plants are drought-plants, though it seems strange to say so. Salt-marsh plants are in the same trouble, as we shall see when we come to them.

The leaves of the Cross-leaved Heath are arranged in sets of *four*, and are flattish, but covered with a fine down below. The stems are downy also. This gives the plant a greyish look, very different from the deep green of the Fine-leaved. The flowers are in one-sided clusters at the tops of the shoots. They are larger than in the Fine-leaved, waxy, and of various shades of pink, from rose-colour and purplish to nearly white. The other heaths bear white flowers also, the Ling especially. As is well known, it is considered lucky to find or even to wear the White

Heather, but there is nothing extraordinary about it; white "sports" (albinos) of other flowers, usually coloured, are often found.

The heaths are pollinated by the long-tongued humble-bees and butterflies, but hive-bees bite through the corolla, and so get the honey without doing any work in return. On the other hand, there are plants which have imitation nectaries, tempting insects to pollinate their flowers, and cheating them of their pay.

4. Furze (*Ulex europæus*).

There are three kinds of Furze, the Common (Fig. 28), which blooms chiefly in Spring, the Small, and the Western Furze, which bloom in late summer and early autumn. That is why we say the Furze is never out of flower. They are equally good examples of drought-plants, and go further than the heaths, for they have no leaves at all, except while very young. As seedlings they have leaves, but these soon become narrower, and pass into spines, which of course give off little water. The spines also keep off cattle which would eat them.

The flowers give us a good example of the great Pea family. There are *five* separate yellow petals, as there are in the Buttercup

or Avens, but instead of forming a cup or plate or star, they are more like a tube, reminding us of the lipped flowers (I, 8), but with this great difference, that the flower is not in one piece, but in five *separate* parts. There is the one broad top petal, called the "**standard**," at the sides the two "**wings**," and at the bottom the pair forming the "**keel**." Inside, the ten stamens have their filaments all joined together at their inner ends. There are five long ones with fixed anthers, and five short with movable anthers. In the middle of these is the pistil with its sticky stigma and its style or stalk leading to the ovary. The keel bursts, when it is pressed down by a bee alighting on it, or by the touch of a finger. The coiled-up stamens and style then suddenly fly out. The bee is dusted with pollen, and the stigma comes against the insect's body. A flower can be properly visited only once.

Later in the year we shall see the seed-pods ripen. (Botanists call them **legumes**, and the name of the Family or Order is **Leguminosæ**.) They will be seen to be short, black, and furry. On a sunny day the two **valves** (shucks) suddenly twist open with a sharp "**pop**," and cast forth the little beans to seek their fortune.

Plants of the **Pea** family have curious lumps (**nodules**) on their roots, as you can easily see by digging one up. These lumps

are said to be caused by a kind of fungus (moulds and toadstools are also fungi). Now this underground fungus is able to make salts out of the soil, while the Furze (like all green plants) makes sugars out of the air. So the two, the fungus and the pea-plant, exchange their goods.

5. Tormentil (*Poteritilla erecta*).

This is one of the jolliest flowers we have. It spangles the heaths, also gravelly wastes and banks, with its bright, brassy-yellow flowers, for months. It belongs to the Rose family, and is a near relation of the Barren Strawberry. The flowers have only *four* petals, except the first on each stem, which often has five. The calyx has always twice as many divisions or sepals as there are petals. If the yellow petals are four, then the sepals are eight; if five, ten. The outer sepals are green in the usual way, the inner are yellowish, as though they had half a mind to be petals. The leaves on the upper parts of the stems are without footstalks (petioles), but the lower ones are often stalked.

The Tormentil is a more or less trailing plant, spreading in a mat on the ground, though the stems turn up at their ends. This habit enables it to do well where water is scarce,

for in this way it shades the ground, preserves moisture, and escapes the wind. It often lodges under taller things as well.

The second or *specific* Latin name *erecta* distinguishes it from its near relation the Creeping Cinquefoil (*P. reptans*), which creeps a long way over the ground, and roots as it goes.

6. Dwarf Willow (*Salix repens*).

The Willows are well known to be water-loving plants, growing in swamps and on river-banks. Some of them are moderate-sized bushes, some grow into mighty trees. But the Dwarf Willow is fitted to live on dry heathlands, and shows it in every feature. It is low-growing, being seldom more than a foot or so high, and it stoops, if it does not actually creep. Its leaves are much smaller than those of ordinary willows, never more than an inch long. They are covered with a sort of felt underneath and the edges are turned back. All this hinders the escape of water. They are often beautifully silvery. As for the flowers, they are in catkins (I, 10) like other willows, the pistils and stamens on separate plants. In late summer the seeds are ripe, and their cottony tufts make them very noticeable.

7. **Dodder** (*Cuscuta epithymum*).

Stretching across heath-plants and dwarf furze will often be seen a tangled network of crimson threads, bearing bunches of tiny, flesh-coloured flowers. This is the Lesser Dodder (Fig. 29), which is what is called a **parasite**—that is, it makes no food for itself, but lives on the sap of other plants. When it sprouts from the seed, it sends up no cotyledons or seed-leaves, but only a delicate thread, which soon grows to a great length, and sweeps gently round and round in the air for something to prey upon. These thin stems put forth small suckers which suck the host-plant's sap. It then lets go its hold on the ground. It never, so far as I know, uses true roots, which in ordinary green plants draw part of their food from the soil in the form of moisture and certain minerals. Thus do the wicked flourish, not like a green bay-tree, for the Dodder has no need for green, nor has it any leaves, but only tiny scales.

We must remember that the green colour of plants comes from chlorophyll "leaf-green"), which is perhaps the most wonderful substance in the world. It enables plants to make starch and sugar out of carbon-dioxide (which is one of the gases of the air we breathe) and water, and thus to build up

its living matter. This great transformation can only be carried out in the presence of sunlight, a fact on which the make-up and behaviour of plants chiefly depends.

If the Dodder fails to find a plant to live on, it dies as soon as the food-store in the seed (which is of the same nature as the white of eggs) is used up. There are other robber-plants, some of which we may meet with in the course of our rambles.

8. Cotton-grass (*Eriophorum polystachion*).

In the wetter parts of the heathlands, in boggy ground, or round about the borders of the bogs themselves, we often find in great quantities the white streamers of the Cotton-grass, which may be seen a mile away. Wherever they appear, they are a warning to wanderers, who must go carefully, or they may sink in the green bog-moss, which looks so firm, but is not.

The snowy, silky tufts of the Cotton-grass grow round the seed-vessels, serving, like thistle-down and the pappus of Dandelions, to scatter the seeds on the wind. The Cotton-grass is not really a grass, but a sedge, and a sedge differs from a grass in having a *solid* stem, which is often three-cornered, and the glumes usually *brown*, not green or purple.

Otherwise, sedges are very like grasses, but, while many grasses, as we all know, are of great use to man and beast, none of our sedges is ever harvested, for they contain no nourishment.

9. **Bog Asphodel** (*Narthecium ossifragum*).

The bright yellow stars of the Bog Asphodel are not so striking at a distance as the white plumes of the Cotton-grass, but on a nearer view are full of beauty. The flowers are small, but the spike of them is a thing of dazzling colour. The stiff, wiry flower-stem rises well above the short leaves, which are pale-green and sword-shaped, looking like those of a very small Iris.

In front of each of the six golden rays of the flower is an orange-scarlet anther. It is borne on a filament covered with primrose-coloured wool. In the centre of the flower appears the green pistil, which is shaped like a pointed cone. Afterwards, when it becomes a capsule of seeds, it grows bigger, and turns the deepest orange, almost as bright as the flowers in their prime. The rays of the flower stay on, shrink, and close round the capsule. They are rather hard and dry, not tender like those of the Lily or Daffodil. On the other hand, they are not so chaffy as those of rushes.

The perianth of *six* divisions suggests that it is related to the lily and daffodil, but it may be a surprise that it should have anything to do with the rushes. Let us note now that the rush is a poor relation of the lily. Every feature of the flower is the same, but on a petty scale. The rush is a lily that has given up attracting insects, and trusts to the wind to scatter its pollen. The Bog Asphodel, then, comes between. Some botanists place it at the bottom of the lilies, others at the top of the rushes.

10. Marsh St. John's Wort (*Hypericum elodes*).

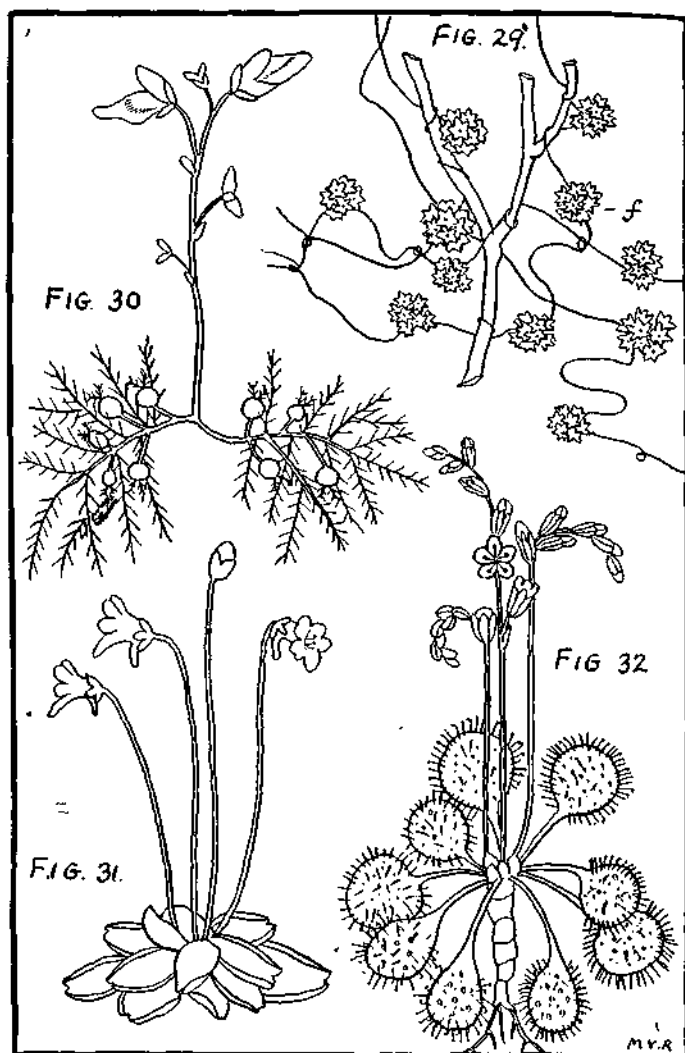
This looks very different from the many dry-land St. John's Worts. It appears in sheets in bog pools. Its little stems, with pairs of roundish leaves, are shaggy with a covering of soft hairs, but the parts under water are without hairs, and the leaves are smaller. The small, loose spikes of flowers grow from the tops of the stems at first, but afterwards (in the strongest ones) from their sides. The flowers, like those of all the family, are yellow. The corolla is in five *separate* petals. The five sepals, which form the green outer cup, or calyx, are fringed with reddish glands (knobs giving out scent, oil, etc.) from which comes, no doubt, the strong smell

like the resin of pine-trees. The stamens are joined above the middle in three bundles. This bundling of the stamens is the chief mark by which we know the St. John's Wort family.

The name "Marsh" St John's Wort is confusing. It is not really a marsh plant. It belongs to the bogs; in fact, as we have said, to the bog-pools.

II. Sundew (*Drosera*).

This plant (Fig. 32) eats insects. In the wet peat, and among the bog-moss, grow the little stars, an inch or two across. The rays (leaves) widen at the ends into round (or oval) plates, covered with crimson bristles. Each bristle carries on its top a drop of sticky stuff that glistens in the sun like a dewdrop. Insects, mistaking this for a honey-gland, are caught, and however hard they may struggle, they never get free, for the dewdrop is stickier than any glue. The bristles, as deadly as the arms of the octopus, bend inwards at the ends. Other tentacles come to their help. The unfortunate insect is forced down upon the leaf, and smothered. If needed, the whole leaf will bend itself over to take part in holding the prey. The tentacles (bristles) give out a juice like that we have in our stomachs,



A* PARASITE AND THREE INSECT-EATERS

Fig. 29, Dodder; Fig. 30, Bladderwort; Fig. 31, Butterwort;
 Fig. 32, Sundew.

and the nourishing part of the insect is sucked into the body of the Sundew. The tentacles then stand up again, give out more glue, and are ready for the next careless insect.

Perhaps the most curious part of this curious story is that the tentacles know what is good to eat, and what is not. They do not move for the fall of rain or dust.

In the centre of the star rises, in late summer and early autumn, the little wiry flower-stem. It bears white flowers, which open only for a few hours.

12. Butterwort (*Pinguicula*).

The Butterwort (Fig. 31) appears among bog-moss as a rosette of pale-green, oblong leaves. These leaves have a greasy look, from which comes its name. This look is due to the presence of glands (little swellings) which, like the tentacles of the Sundew, give out a sticky fluid, by which small insects are caught. Rain then washes the insects to the edges, which turn up a little, and hold them there. The leaf then rolls on itself, covers and devours its prey, much as the Sundew does.

The plant sends up one or two little stems, bending at the top, so as to hold out sideways its one flower. In the kind found in the South, the flower is pale lilac touched with

yellow. It has a corolla in one piece, slightly lipped, and there is a spur behind. The larger Butterwort of the North is a darker blue and is more deeply lipped.

13. Bladderwort (*Utricularia*).

This (Fig. 30) is a true water-plant, growing in bog-pools. It has the finely divided leaves, with hair-like parts, which we so often see in water plants, such as the under-water leaves of the Water Crowfoot. Upon the leaves or on special stems are many little bladders, which catch water-mites and other tiny creatures, as lobster-pots catch lobsters. The little animals push their way into the bladders through trap-doors which open only from the outside, so they cannot get out again. The plant feeds on them somehow, but no trace of a digestive fluid has been found.

The flower rises above the water. It is yellow, and has a distinct lip, and a spur.

In the greenhouses in Kew Gardens may be seen insect-eating plants of a very much larger size, such as the famous Pitcher-plants from Borneo, Australia, and North America. Some of these have jug-like traps nearly 2 feet high, and will hold a couple of gallons of water. Then there is the Venus' Fly-Trap from Carolina, which closes the two halves of

its tooth-edged leaves over the unlucky insect, as a pair of jaws might do.

EXERCISES

(1) Find good specimens of the flowers described in this chapter. Draw them as well as you can and colour the drawings as nearly as you can to the colours of the flowers when fresh. Mark by means of arrows the different parts of the flowers in these drawings.

(2) Note in what positions you found the flowers mentioned in this chapter, in what soil they were growing, sand, clay, chalk, etc.

(3) Write out and learn the meanings of the words in the Word List.

(4) Watch the plants of this chapter and note what insects visit the flowers.

(5) How do Drought Plants live with very little water?

(6) How do you tell the difference between the Ling and the two Heaths?

(7) What is peculiar about the Dodder?

(8) And the Sundew?

(9) How do plants get their food?

WORD LIST

carbon-dioxide	fungus	Leguminosæ
chlorophyll	standard	valves
drought	wings	7. parasite
plants	keel	10. glands
transpiration	legumes	11. tentacles
4. nodules		

VI. CLIMBERS IN THE HEDGES

WHEN we return to the hedges later in the season, we find, in many places, that they are given up to the climbing plants. They have got in front and at top of all. Their very weakness is, we may say, their strength. Their stems are too weak to stand by themselves, so they struggle up into the light and air by clinging to sturdier plants, such as the Thorn-bushes, the Dogwood, the Hedge Maple, and other shrubs of which hedges are commonly made. They do this in various ways. In some the stem has the power of twining round supports. Others have the leaves, or part of the leaves, changed into clutching tendrils. In others special branches lay hold in the same way. Others climb by their petioles. In others the long stems are covered with hooks, which keep them from slipping back. Let us look at some of these different sorts of climbers.

1. Woody Nightshade (*Solanum Dulcamara*).

The Woody Nightshade, or Bittersweet (Fig. 34), has the power of climbing only to a slight

degree, and therefore we take it first. It twines a little, and it hooks itself by its petioles a little, and often it just threads its quickly-growing stems through the bushes, and it manages quite well. There are few hedgerows or thickets or rough corners without it.

Common as is the Woody Nightshade, it is not rightly known to many people, who mix it up with the Deadly Nightshade or *Belladonna*. But this is a very different and much rarer plant, with stiff stems, and single bell-shaped flowers, and, of course, single berries. Now our Woody Nightshade bears its flowers in clusters, and they are almost exactly like those of the Potato (a near relation), only smaller, and of a richer purple colour, with five pointed rays, from the centre of which stand out the five long, yellow anthers, joined round the long, out-thrust pistil. The bunch of oval, bright scarlet berries is not in the least like the single, large, round (rather flattened) black one of the terrible *Belladonna*. However, the berries of the Woody Nightshade, if not exactly poisonous, as the other is, are not fit to eat, and have been known to make children ill. Both plants are famous in medicine.

The Woody Nightshade is so called because the lower parts of the stems are woody, and live on from year to year. Those of the

Deadly Nightshade die right down to the root in winter, whence fresh stems spring up next year. It is what gardeners call an **herbaceous** plant.

2. **Goosegrass** (*Galium Aparine*).

The Goosegrass or Cleavers is a true herb—that is to say, it is not woody, nor is it herbaceous in the sense used by gardeners, meaning a plant with annual stems but perennial (everlasting) rootstocks. The Goosegrass is altogether an annual. It springs up from seed, flowers, fruits, and dies, all in one season. Its thin stems grow upright at a great rate where there is something to cling to. When there is not, it lies down and branches freely. The stems are four-sided, with thickened corners, which are covered with hooks pointing downward. This keeps the stems from slipping back while it is trying to grow over its neighbours.

The leaves are also hooked, and seem to be in **whorls** (or circles) of six, sometimes more. I say seem, because botanists declare that only two are true leaves. The others are stipules, like those we saw on the Avens (II, 6). The true leaves are on opposite sides of the stem, and at right angles to those above and below. This is a very common arrangement, already

noticed in the Bugle, etc. (I, 8). It is from the axils (angles) of the true leaves, and from them only, that branches spring. They will, therefore, be expected to appear in pairs, but most often there is only one. The other has come to nothing.

The many tiny, whitish flowers appear on slender, leafy branches. They are flat and four-pointed. The honey-disc (nectary) being easily reached, the flowers can be pollinated by short-tongued insects of less sense than bees. And as pistil and anther ripen at the same time, self-fertilisation may happen. The fruits are in double globes, covered with hooks which spread the seed by clinging to passing creatures. From this comes the name **Cleavers**. The other name is because geese are fond of it.

3. Great Bindweed (*Calystegia sepium*).

The Great Bindweed, or Hedge Convolvulus, with its large, snow-white, trumpet-shaped flowers, is one of the most striking ornaments of the hedges. Not only are the blossoms of noble size and purity of colour, but the foliage is handsome. Looked at closely, the rim of the flowers will be seen to be faintly *lobed*. This seems to mean that the flower was in separate petals in far-distant

ages past, but now are joined together. Flowers with united petals are believed to be an improvement on those with separate petals.

The calyx is in five free sepals, and a peculiar feature of this plant is the extra protection given by a pair of broad bracts just below the calyx, and entirely covering the flower when in bud. The leaves are more or less heart-shaped, some blunt, some pointed, and the lobes at their base often look as though they had been cut by scissors.

The Bindweed is an herbaceous perennial. The stems, which grow very fast indeed, and cover many yards in a season, die down to the ground when winter comes. But the everlasting rootstocks or underground stems (commonly but wrongly called "roots") increase very quickly. They are rather thick and fleshy, running length-wise in every direction, and as every piece an inch or so long will grow into a fresh plant, it is a terrible pest in gardens, smothering everything.

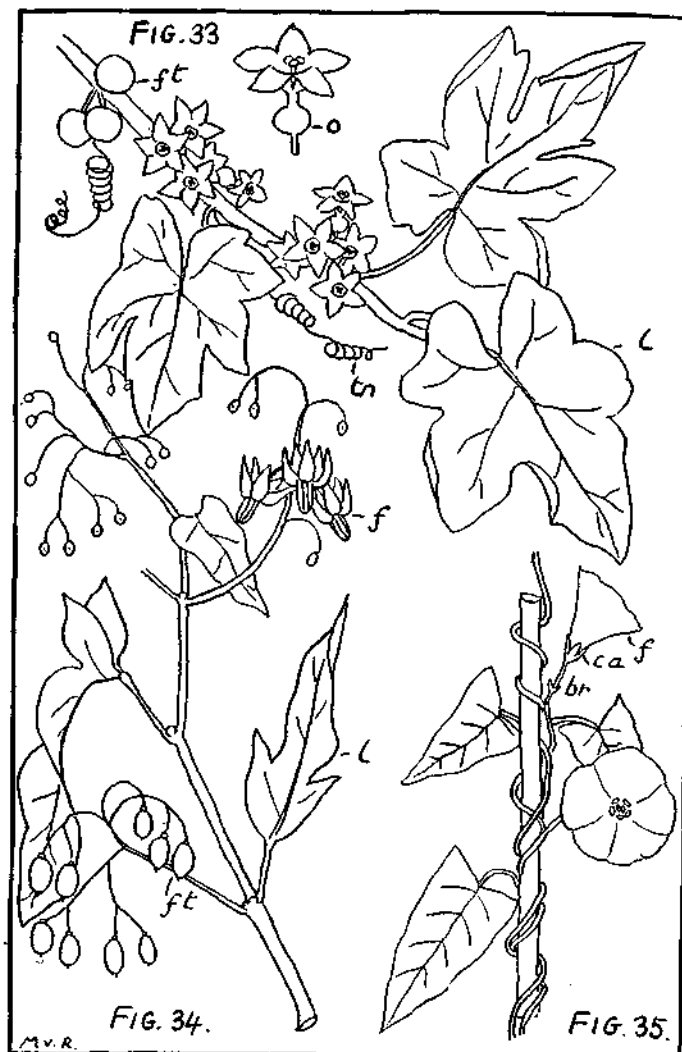
The plant is a twiner. Its thin stems wind round any support that is not too thick. They turn from west to east, the *opposite* of the sun's course and of the hands of a watch. Most climbers do the same, but there are a few, as we shall see presently, that twine the other way—that is to say, *with* the sun. The

Woody Nightshade, though it can twine only slightly, can do so in either direction.

The Lesser *Convolvulus* (*Convolvulus arvensis*) (Fig. 35) has a smaller, but very pretty almond-scented flower, often marked with pink wedges. The bracts are small, and further down the petiole or foodstalk. It is often seen in hedges, but more often, perhaps, in fields, running up the stems of grasses or corn.

4. Black Bryony (*Tamus communis*).

The Black Bryony is not unlike the Bindweed before it comes into flower. Both have heart-shaped leaves, but those of the Black Bryony are more evenly so, and usually taper to a long point. They are also of a darker green, and very glossy. The stems twine as strongly, but in the opposite direction. But the flowers are quite different. The flowers of the Black Bryony are small, in clusters, greenish-yellow, and are nothing much to look at. They are what we call **unisexual**—that is, the pistils and the stamens are in separate flowers and also on separate plants, like the Willows (I, 10). The stamen-bearing or “false” flowers are in long strings, the pistil or seed-bearing in shorter clusters. It will be noticed that all the parts are in *threes*. The flowers have



CLIMBERS

Fig. 33, White Bryony (♀ plant); Fig. 34, Woody Nightshade;
 Fig. 35, Lesser Convolvulus.

six rays. The stamens are six, the pistils are in divisions of three, and if you cut them open you will find the ovaries are three-celled, with not more than three ovules in each cell. By this you will know that the Black Bryony is a "monocot," and related to the lilies, daffodils, and irises. But it is not parallel-veined, like them, but net-veined. One of Nature's freaks.

The oval berries are scarlet, rather large, and shining. The long strings of them make a fine ornament in the hedges and woods, late in the year.

5. White Bryony (*Bryonia dioica*).

Except that it bears red berries, there is little in common between the White and the Black Bryony. The latter (Fig. 33) has got its name by one of those confusions common in the popular naming of plants. The old herb doctor, Culpepper, who wrote in the time of Charles II, seems to have shared in this confusion. He gives a picture of the Black Bryony, and describes the White, which he does so well in his old-fashioned language that I cannot do better than copy what he says:—

"The common White Briony groweth ramping upon the hedges, sending forth many long, rough, very tender branches, with many rough and broad Leaves thereon,

cut (for the most part) into five partitions, in form like a vine Leaf, but smaller, rough, and of a whitish hoary green Colour, spreading very far, and twining with his small clasps (that come forth at the joints with the leaves) very far on whatsoever standeth next to it. At the several joints (especially towards the Top of the branches) cometh forth a long stalk bearing many whitish Flowers together in a long tuft, consisting of five small Leaves a-piece, laid open like a Starre, after which come the Berries, green at the first and very red when they are thorough ripe, of no good scent, but of a most loathsome Taste. The root groweth to be exceeding great, with many long branches going from it, of a pale whitish colour on the outside, and more pale within."

To this we may add that the White Bryony, like the Black, has its male (or **staminate**) and female (or **pistillate**) flowers on different plants. The female flowers are easily known by the round ovary below. There is a little neck or stalk between flower and ovary. It is a very clear example of what is called an **inferior ovary**. "Inferior" means simply "lower."

Culpepper's "small clasps" are, of course, the tendrils. They are not so very small, being often 15 inches long. "Coming forth at the joints with the leaves," they are not formed out of the leaves themselves, as they are with vetches and peas. They are of the nature of branches. They are themselves without branches, and straight, except for a

curve or hook at the end. Their action is one of the most wonderful things in Nature. The curved end swings round in a circle (like the tops of twiners) till it comes against something it can lay hold of. This the end surrounds in a tight clutch. Then the tendril shortens itself by coiling like a wire spring. One half turns one way and the other half the other way, with a straight piece in the middle. This middle piece, we are told, turns like a crank, and brings about the double coil. The tendril then gets thicker and harder, so that it can stand any strain likely to be put upon it. The White Bryony belongs to the Cucumber family, and is the only one of this family among our wild flowers.

6. Tufted Vetch (*Vicia Cracca*).

Here (Fig. 36) we see another kind of tendril, not a changed *branch* as in the White Bryony, but made out of part of the *leaf*. The vetches have pinnate or winged leaves—that is to say, with pairs of leaflets along the midrib. In the Tufted Vetch there are usually *ten* pairs of pointed leaflets. They are narrow and crowded, bluish-green, especially beneath. There would be eleven pairs and an end one, but the top pair and the end one have changed into three “small clasps.” Though they

curl when they have nothing to cling to, they have not the Bryony's power of drawing together by twisting. There is no need, as they are so much shorter. But all three clutch and hold on firmly to whatever support comes within their reach.

Vetches belong to the Pea family, like the Furze, but there is one difference. The Furze has all its stamens fastened together in a bundle, but in Vetches there is one stamen free from the rest.

The seed-pods are black when ripe, and, like those of the Furze, twist and jerk out their seeds. Being longer and thinner, they give us an even more striking example of this form of what is called **explosive mechanism**.

The Tufted Vetch is one of the most handsome of all vetches. It bears dense, one-sided clusters of twenty or more flowers, on a stalk (peduncle) long enough to show them well above the leaves. The colour is a fine purplish-blue. These clusters, which are very many, are borne on stems sent up by the tough, stringy, matted rootstocks every year. The plant is therefore a perennial. So is a smaller kind, the Bush Vetch, which has dull purple flowers, and is often seen in or near hedges. As the stems of the Tufted Vetch are many, and often grow to a length of several feet, or even yards, a plant will cover a large space.

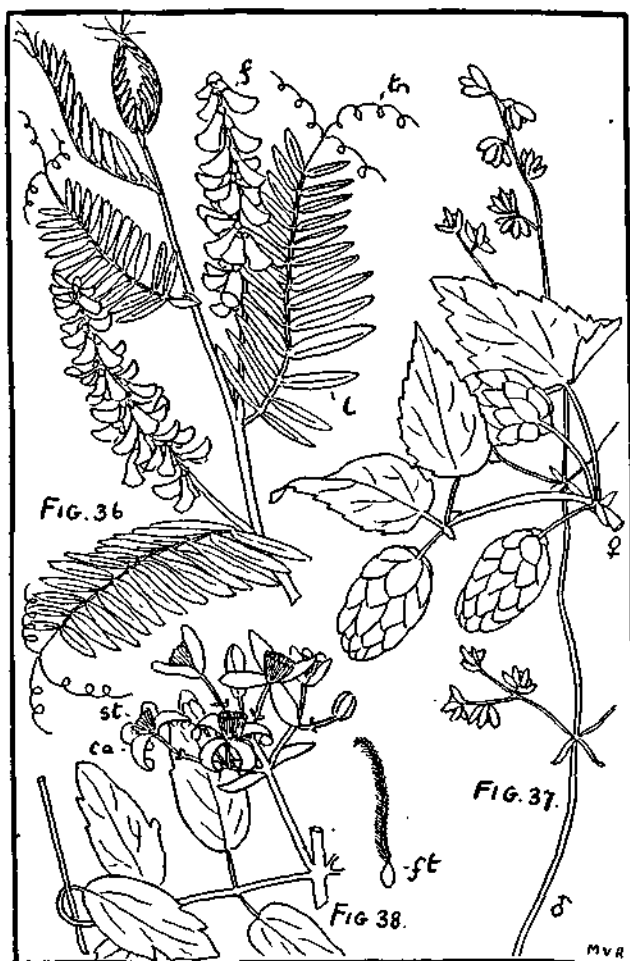
It is therefore a great enemy to plants growing near it, but a friend to cows and horses, for whom it is nourishing food.

7. **Honeysuckle** (*Lonicera Periclymenum*).

The charming and richly scented flowers of the Honeysuckle are what the botanists call "falsely irregular." It looks as though it belonged to the Lipped Family (Labiatae), like the Bugle or the Sage of gardens, but it does not. It is related to the Elder and the Guelderrose. This is puzzling, but we must let it be so for the present, and go on to simpler matters. The flower is pure white or creamy-white (turning to a deep amber-yellow with age) and red outside. It has a very long tube, so that its honey can only be reached by the very long-tongued hawkmoths.

The Honeysuckle is a twiner like the Black Bryony and turns the same way. The stems do not, however, die down in winter. They are woody, and live on from year to year. In the course of years the Honeysuckle will become of a great height, running up to the tops of tall trees. It drops its leaves in winter, but fresh ones appear very early. The plant is often quite green in February, when everything else is bare.

PLATE XII.



MORE CLIMBERS

Fig. 36, Tufted Vetch; Fig. 37, Hop; Fig. 38, Traveller's Joy.

8. Hop (*Humulus Lupulus*).

This (Fig. 37) is another left-to-right twiner, like the Honeysuckle and the Black Bryony. It is odd that three out of the four twiners we have chosen to talk about should belong to the sort of which there are fewest. We chose them because they are the most often seen. But most twiners throughout the country and the world are right-to-left like the Bindweed. The Hop is herbaceous, and, like the Bryonys, as well as the Bindweed, it sends up annual shoots from a perennial rootstock. This rootstock is not fleshy like those others, but tough and almost woody. Though the growths start rather late, it makes up for it by its great strength and quickness. It will easily run up to the top of a house.

The leaves are **opposite**—that is, in pairs—on the stem. They are not **alternate** (that is, one here and one there), as they are in the others. They are rough with hairs, like those of the White Bryony, but they are of a much tougher and harsher make. They are broadly heart-shaped in general outline, but are often cut into three or five lobes. The edges are sharply toothed. The stem bears a great many small hooks, so that the Hop is well off; it can climb in two ways.

Like the Bryony again, one Hop plant has

only flowers containing stamens and another flowers with pistil only; the two sorts of flower are not found together on one plant. The Hop is unisexual. (Did I point out that this is one of the many ways of bringing about cross-pollination?) The stamen flowers or pollen-bearers appear in the upper joints in loose clusters. They are small, yellowish-green, and made up of a star of five rays with five stamens inside. The female or seed-bearing flowers form the well-known "hops." These are roundish or oval heads or cones of broad, closely-packed bracts or scales. Each of these bracts covers a couple of flowers, and afterwards fruits, by which time the cones have grown much bigger.

The use of hops in beer we all know, but we do not all know that in the old days of "Merrie England" it was not used in English beer. It only flavoured the poorer drink brought from Germany and Holland.

9. Traveller's Joy (*Clematis Vitalba*).

The wild *Clematis* (Fig. 38) was first given the name "Traveller's Joy," so we are told, by John Gerard, the famous barber-surgeon, herb-doctor, and gardener of the time of Queen Elizabeth. He so called it, he tells us, on account of its "decking and adorning

Waies and hedges where People travell." This it does rather more than farmers always like. It is another extremely great grower, and with its large leaves it is apt to smother everything else in the hedges.

The leaves are long-stalked, and are made up of about five leaflets. These leaflets are oval, somewhat pointed at the top, and heart-shaped at the bottom. The edges have usually two or three large teeth, or we might call them small lobes. The leaflets are joined by long petioles to the main leaf-stalk. They are some distance apart, so that altogether there is a good deal of free stalk, and it is by these the Clematis climbs, using them like tendrils (they are called **petiole tendrils**), clutching everything at hand, even one another.

Though the leaves drop in winter, the stalks remain hard and woody, as does the whole plant. The main stem, in old plants, will become as thick as a man's wrist. Like the Honeysuckle, it will often cover yards and yards of hedges and even tall trees with its greenery and fluff.

The flowers, which appear late in the season in large clusters, are formed like those of the Wood Anemone, to which the Clematis is related. But they are not so ornamental, being greenish and small. As with the Anemone, also, it has no petals, only four,

five, or six narrow sepals. The plant becomes better to look at when in fruit, for the numerous styles do not wither away as in most plants, but become feathery, and are then very striking and pleasant to see, and have gained for our Clematis the name of Old Man's Beard. By and bye, the seeds, each with its plumy wing, are blown far and wide.

EXERCISES

(1) Find good specimens of the flowers described in this chapter. Draw them as well as you can and colour the drawings as nearly as you can to the colours of the flowers when fresh. Mark by means of arrows the different parts of the flowers in these drawings.

(2) Note in what positions you found the flowers mentioned in this chapter, in what soil they were growing, sand, clay, chalk, etc.

(3) Write out and learn the meanings of the words in the Word List.

(4) Watch the plants of this chapter and note what insects visit the flowers.

(5) Describe as many different ways of climbing among plants as you can.

(6) How can you know the true leaves of the Goose-grass from the stipules?

(7) In what ways is the Tufted Vetch like the Furze?

WORD LIST

- | | | |
|---------------|-------------------|---------------------|
| tendrils | 5. inferior ovary | 8. alternate |
| 1. herbaceous | staminate | opposite |
| 2. whorls | pistillate | 9. petiole tendrils |
| axils | 6. explosive | |
| nectary | mechanism | |
| 4. unisexual | | |

VII. CORNFIELDS AND FARM LANDS

THERE are certain wild plants which are found only where men have been at work. They grow in ploughed fields, gardens, allotments, and so on, and are known to botanists as "weeds of cultivation." They appear at all seasons of the year. They are nearly all quick-seeding and quick-sprouting annuals, and grow and flower along with the garden or farm crops that they live among. For instance, in early spring a strip of ground is cleared, dug, and manured for a sowing of broad beans. Soon up come the beans—and the weeds. Later the gardener raises a fine bed of onions—and a great variety of weeds. In autumn he lays down a breadth of winter cabbage—and provides the botanist with a big stock of wild flowers, long after they have become scarce in hedgerow, marsh, and wood.

1. Large Field Speedwell (*Veronica Tournefortii*).

In January, almost as freely as in July, will the long, leafy trails of this pretty weed

(Fig. 40) be seen. But the flowers stay closed on most winter days. They open only in bright sunshine. Though it is now seen everywhere in ground that has been turned over, this Speedwell has not been very long in this country. It is a plant of Southern Europe, and is said to have been brought into Britain with clover seed. Its name is not found in the botany books of a hundred years ago.

The blossoms of the Large Field Speedwell are comparatively big and showy, like those of the well-known Germander Speedwell, which grows on banks and other ground not often meddled with. But the flowers come singly, not in strings or racemes, as they do in the Germander, and they are of a lighter colour. The lowest of the four divisions of the corolla are almost white. Moreover, it is an annual, like all true weeds of civilisation, while the Germander and many other speedwells are perennials.

I do not say that no perennial weeds are ever seen in gardens. We know how troublesome are docks, plaintains, crowfoots, couch, etc. But these are more truly waste-place or wayside plants, finding a footing in gardens, chiefly among fruit-bushes and other things not often moved. Watch any garden that has been left untouched for some years. At

first the annual weeds have it all their own way. Then the perennials come in, a few at a time. And in six or seven years hardly an annual will be seen. The garden has become a waste place.

Speedwells have only two stamens. Their seed-vessels (capsules) differ from those of most other plants; they are flattened and more or less divided into two parts. They split open round the edges, and hold only a few seeds.

2. Shepherd's Purse (*Capsella Bursa-pastoris*).

The Shepherd's Purse (Fig. 41), like its fellow crucifer, the Garlic Mustard of the hedges, bears small, white flowers with four petals. But the seed-vessel is different. Instead of a long pod we see a short, heart-shaped, or three-sided pouch. Well-grown, branching stems of these seed-vessels, perhaps 15 or 18 inches high, are far from ugly in vases, especially if mixed with high-coloured flowers like Poppies or Corn Marigolds. Except in shape, the make-up of the pouch is the same as the pod. It opens at the *bottom* by two valves, showing a thin wall in the middle, on which are the seeds. This is where pouches differ from capsules, which are also dry (not fleshy) seed-vessels,

but always open at or near the *top*, at any rate not at the bottom. (There is one exception, the Greater Celandine, but this has no dividing wall.) We have already noticed the capsules of the Primrose and the Speedwell, and shall come to others.

Seeds of the Crucifer family are well known to gardeners for their power of coming up quickly. Mustard and Cress (so much sown for salads, and eaten in the seed-leaf) are famous for this, and their relations, Wallflower, Stock, Cabbage, Turnip, are only a little less so. While these take only three or four days to make a start, Parsley needs forty to fifty days, the Chestnut a year, and the Hawthorn and the Hazel two years.

The Shepherd's Purse has a long, tapering root, which bores deep into the ground. This enables it to reach moist soil even in the driest weather. It also protects itself from drought by its flat rosette of leaves, which shade the ground, like the Dandelion (III, 7) and many other plants. The rosette also keeps other plants from growing too near.

In different plants the leaves vary very greatly in shape, some being deeply cut, almost like a comb, while others are almost entire. Those on the wiry stems are smaller, sometimes toothed, sometimes not, clasping the stem with projecting lobes.

3. Common Groundsel (*Senecio vulgaris*).

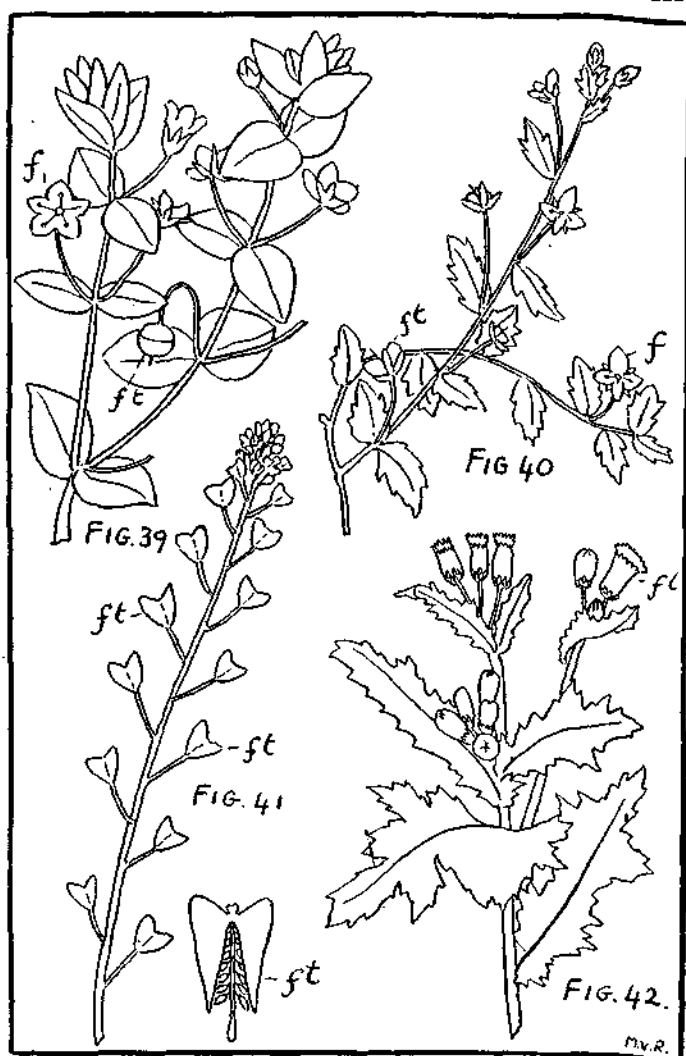
The Common Groundsel (Fig. 42) is not only one of the commonest weeds of gardens, but will flourish wherever it can root, even on walls. But its happy home is dug ground. There it comes up, flowers and seeds, comes up, flowers and seeds, over and over again, all the year round. It holds on to life against all odds. Pull it up and throw it anywhere cooler than a bonfire, and it will send down roots, ripen its seeds, and send them forth on their silky sails to seek out every bare inch of ground.

If not the commonest of plants, it is the commonest of composites. It is closely related to the Dandelion and the Daisy, but its florets have no straps (ligules), even the outside ones. It bears only little heads of disc-florets (III, 8), which are entirely self-fertilising. This shows that though quality may come from cross-fertilisation, quantity comes from self-fertilisation.

The plant is not without its uses. It is a favourite food of birds. In old times it was much used as a medicine, and sometimes is still.

4. Red Deadnettle (*Lamium purpureum*).

Among weeds of cultivation the Red Deadnettle is one that is seen very often indeed.



WEEDS OF CULTIVATION

Fig. 39, Pimpernel; Fig. 40, Large Field Speedwell; Fig. 41, Shepherd's Purse; Fig. 42, Common Groundsel.

It is not a showy plant, even when its floral leaves—that is, those on the upper part of the stem, among the flowers—are coloured, which they often are. Still, a patch of it looks cheerful on a winter day, when there is very little colour to be seen. The blossoms are nothing like so large as those of its near relations, the White and the Yellow Dead-nettle. Only humble-bees can reach the honey in the last-named, but smaller bees, with shorter tongues, visit and pollinate the Red Deadnettle.

The little stems are *square*, as they are in most plants of the Lipped Family (*Labiatae*). The whole plant has a strong and rather disagreeable smell. This is another feature of the family. I ought perhaps to say that the labiates have a scent, which is often strong and sometimes unpleasant. On the other hand, many of these plants have a scent we like, such as the Mint, Thyme, Savory, Marjoram, Bergamot, Sage, Lavender, and Rosemary. The smells of labiates seem always rich and warm, just as the umbellifers, such as the Celery and Parsley, are cooling, though one umbellifer at least, the Caraway, is warm. Crucifers, such as the Mustards and Cresses, are sharp and hot-smelling.

5. Chickweed (*Stellaria media*).

Chickweed is a relation of the Stitchworts, having brittle stems, swollen joints, opposite leaves, and split petals. But it is a very humble relation, without any good looks. The blossoms are very small, and are either self-pollinated, or pollinated by tiny crawling insects such as beetles and flies. The habit of the plant makes it a mischievous weed, for it forms a flat but thick mat, smothering garden seedlings and small crops. It will occasionally spread to a yard across. Hand-weeding is not very easy. The brittle stems break off in the hand, leaving enough on the root to grow again.

It will be noticed that the pairs of oval, pointed leaves are stalked on the lower parts of the stems, but without stalks, or as we say **sessile** ("seated") on the stems above. A closer look will show us a line of hairs down one side of the stem.

Humble as the Chickweed is, it has its uses. It is a *chick* weed; it feeds the birds. In old times it was called Hen's Inheritance.

6. Scarlet Pimpernel (*Anagallis arvensis*).

Some people say that the Corn Poppy and the Pimpernel (Fig. 39) are our only scarlet

wild flowers. But they are quite different shades of colour. The Poppy is scarlet on the crimson side, and the Pimpernel scarlet with a tinge of salmon or orange. But call the colour what you like, it is a beautiful little flower with its purple eye, and there is nothing like it. There is a pale pink form, which is rare, and a splendid blue one, not so rare.

The anthers come opposite the middle of each petal, which is a feature of the Primrose family, to which it belongs. In other families the stamens come opposite the spaces between the petals. The seed-vessel (ovary) is a perfect little ball. It splits round the middle, and the top comes off like a skull-cap. The plant is a trailing annual, of neat growth. The leaves are a broad oval, without petioles, in pairs on the stem. The flowers come singly, on rather long peduncles (stalks) in the axils (angles) of the leaves, in the same way as the Large Field Speedwell.

The Pimpernel well deserves its name of Poor Man's Weather-glass, for no flower answers so quickly to sunshine and shade. It opens only in bright weather, and besides that, it opens for the day between nine and ten in the morning, and closes between two and three in the afternoon. Flowers vary very much in their daily opening and closing.

The Goatsbeard, for instance, closes before midday, the Carline Thistle not till eight or nine in the evening.

7. Corn Poppy (*Papaver Rhœas*).

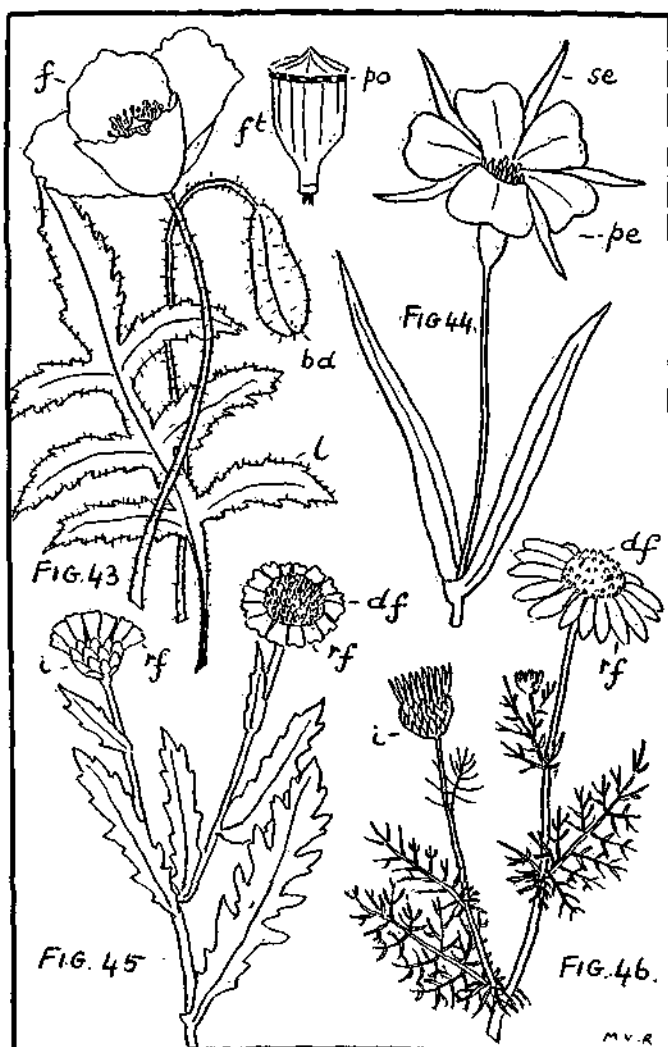
A field of oats or barley, splashed and speckled with the scarlet of the Corn Poppy (Fig. 43), is a sight to thrill the eye of the artist, little as it may be to the taste of the farmer. As for the botanist, he has not only the pleasure of the spectacle, but also the interest in seeing how this gorgeous flower is made up.

The two outer petals are so wide that they are enough to make a large cup of themselves, but the two smaller inner ones, set at right angles to them, and overlapping their ends, add greatly to the richness of their appearance. Being so thin, and fastened by a mere point at their lower edge, they flutter at the slightest breath. Here is often seen a black blotch, the four together forming, for the pious Christian, an image of the Cross. But in earlier religions the flower was a sign of the goddess Ceres, the Earth-Mother, the friend of farmers.

In the centre of the flower are a great many blue-back anthers on crimson filaments. They make a ring round the yellow-green ovary.

The ovary is vase-shaped, and capped by a disc which carries a number of black or brown stigmas. These stigmas are in lines, spreading like the spokes of a wheel. There are no styles. As the ovary ripens and becomes a capsule, it swells and gets rounder. It turns grass-green, of a deeper shade than the stem, and afterwards brown when quite ripe. Inside there are as many cells or chambers as there are stigmas, but the walls do not quite reach the centre. To these walls are fastened great numbers of seeds. The seeds, when ripe, are let out by pores or holes which open right under the brim of the disc. The brim has grown out all round the top of the capsule, and keeps off rain like the eaves of a house. There are as many pores as there are stigmas and walls. The seed-vessels of Snapdragons and some other plants open in this way. A few seeds are let out at a time, whenever the wind shakes the stems. This is another way of scattering seeds, and we call it "**censer mechanism.**" A censer, you may know, is a vessel of incense which is swung in Roman Catholic churches. There is no honey in Poppy-flowers, and no cross-fertilisation. But bees visit them for pollen, which they have in plenty.

So much for the flower and fruit. Now for the bud, which we passed over. There are



CORNFIELD PLANTS

Fig. 43, Corn Poppy; Fig. 44, Corn Cockle; Fig. 45, Corn Marigold; Fig. 46, Scentless Mayweed.

only *two* sepals. They are spoon-shaped, and covered, like the rest of the plant (except the capsule), with bristles which stand stiffly out. The sepals drop off as the petals open and spread out. The petals are not, as in some flowers, folded or twisted in bud, but crumpled. They are packed so tightly inside the sepals, that if you only touch a full-sized bud, they burst out, and hardly ever get smooth.

At first the buds hang down by a bend in the stem. This is not weakness in the stem, for the buds are lifted up as they grow bigger or heavier. It is because, at this period, one side of the stem grows faster than the other; later on the fruit is held straight up. The stem is long and has no leaves on it, but there are plenty near the ground. The lowest leaves are large, with stalks, also wings. They have lobes which are spear-shaped, cut at the edges, and pointed. Sometimes these wings are winged again.

8. Corn Cockle (*Lychnis Githago*).

This (Fig. 44) is a true plant of cornfields. It hardly ever seems to care for any other company than oats, barley, or wheat, though lately it has been found among vetches. It has long stems as the corn has, and flowers at or near the same level. The blossoms are quite large and

rather flat, of a pinkish purple, with *five* petals, which are not more than slightly nicked. I mention this, because it is a relation of the Stitchwort, which, as we have seen, has deeply split petals. They both belong to the Pink family, with simple leaves, coming in pairs from swollen joints. The Corn Cockle has upright stems, with few branches, or sometimes none. The leaves are long and narrow. The whole plant is covered with long, soft, whitish hairs, pressed down, not standing out like the bristles on the Poppy.

But the great feature of the Corn Cockle is the calyx, which has *five* very long, narrow, green sepals coming out beyond the petals. I do not think there is any other flower like it. These sepals are joined below and cover the capsule, which, when ripe, opens at the top with five points.

9. Corn Marigold (*Chrysanthemum segetum*).

This plant (Fig. 45), unlike the Corn Cockle, has many branches, when it has room enough. Then it grows into quite a little bush nearly 18 inches high. For this reason, it likes the edges of the cornfields. When growing in the midst of the corn, it has few branches. The leaves are egg-shaped, broader at the upper end, and petiolate (stalked). Those on the

stems clasp it, and are quite narrow. They have no hairs on them and are very smooth. But it is their colour that we are struck by most, for it is a fine pale bluish- or greyish-green. The flowers are something like Daisies, especially like Ox-eye Daisies, but are a rich golden yellow, rays, disc, and all. We ought to call them flower-heads, for they belong, of course, to the Composite family. The ray-florets are rather short and broad, with a nick in the end.

10. Scentless Mayweed (*Matricaria inodora*).

This (Fig. 46) is the commonest of all our "Marguerites." In fact, it is one of the commonest of our weeds of cultivation. Nobody seems ever to gather it, yet it is a pretty thing, with large flowers, though not so large as the favourite Ox-eye. It is a spreading plant, with much beautiful emerald-green foliage, and thread-like divisions, with a rich, feathery look. It is entirely without smell, which is a good thing, as some of its near relations have unpleasant smells.

11. Wild Camomile (*Matricaria Chamomilla*).

The Wild Camomile is rather badly named, for it is a Mayweed, not a Camomile. It has

no scales between the disc-florets, which all true Camomiles have, but Mayweeds have not. But it came to be so called because it was sometimes used in medicine instead of Camomile. It has a faint but rather pleasant smell, like that of the Camomile (which is a perennial plant and grows in grassy places). The chief feature of the Wild Camomile is that, as the flower-head gets older the disc gets higher, till it becomes like a sugar-loaf or cone. The receptacle beneath then becomes hollow. It grows more upright than the scentless Mayweed, and has fewer leaves.

12. Corn Camomile (*Anthemis arvensis*).

This is a real Camomile, with narrow, yellowish scales between the florets. It is a straggling grower, with stems sometimes 2 feet high or long. The leaves are a trifle wider than in the two Mayweeds, and a coat of very fine hairs makes them appear grey. It is not found everywhere, like the Scentless Mayweed, but may often be seen in great quantity. Sometimes it is the chief weed among the growing wheat, or turnips, or clover.

EXERCISES

(1) Find good specimens of the flowers described in this chapter. Draw them as well as you can and

colour the drawings as nearly as you can to the colours of the flowers when fresh. Mark by means of arrows the different parts of the flowers in these drawings.

(2) Note in what positions you found the flowers mentioned in this chapter, in what soil they were growing, sand, clay, chalk, etc.

(3) Write out and learn the meanings of the words in the Word List.

(4) Watch the plants of this chapter and note what insects visit the flowers.

(5) What likeness can you find between the flower of the Common Groundsel and those of the Dandelion and of the Daisy, and what difference?

(6) What is the Poor Man's Weather Glass and how does it behave?

(7) Why do Corn Poppy buds droop at first and then as the bud becomes heavier hold themselves upright?

(8) What is the difference between a true Camomile and a Mayweed?

WORD LIST

5. sessile 7. censer mechanism 9. petiolate

VIII. SEA-SHORES

WHEN we were walking over the heaths, by the river-sides, and about other places, wet and dry, we noticed the way in which plants were fitted to live in these various situations. Where there was too much sunshine or too little, too much water or not enough, the plants were changed to match. Nowhere are these changes more marked than in sea-shore plants, which, in many cases, develop very special features. Their leaves or other parts are either fleshy, or leathery, or coloured grey from a downy or waxy covering. These are all ways of saving water, and give a very peculiar and special look to the plants of our coasts. These plants may be divided into two kinds: (1) cliff, shingle, and sand plants, and (2) salt-marsh plants, though some plants are found in both. Now, as to the first kind, it is quite clear that, like heath (and chalk) plants, they must be true drought-plants, prepared to live where there is much sunshine, much wind, and where rain passes quickly away. And as for the salt-marsh plants, they are also bound to be careful

of water. There is plenty round about them, to be sure, but it is salt water, and not good for the health of plants. We will look at some cliff, shingle, and sand plants first.

1. **Sea Campion** (*Silene maritima*).

From spring till autumn the pretty flowers of the Sea Campion (Fig. 47), with their white petals and their purple anthers, will be found trailing over the stones of the shore. It is a near relation of the Bladder Campion so often seen in fields and by-lanes, and well known to children for its large, swollen calyx, which they "pop" between their hands. The difference between them is quite a lesson in what botanists call **adaptation** (which we have described as fitting itself to its surroundings). The Bladder Campion grows upright to the height of 18 inches or more, but the Sea Campion creeps over the ground, out of the way of the wind, and shading its roots. The leaves of the Bladder Campion are green, but those of its long-shore relation are bluish. This colour is due to a waxy coat, by which the leaves are shielded from the sun. The roots are long, digging deep for water. The flowers are in clusters, rising only a little above the plant. The *five* petals are clearly cut, but not so deeply as those of the Stitchwort (II, 4).

However, its opposite leaves and swollen joints show it is related.

2. Thrift (*Armeria maritima*).

The Thrift or Sea Pink (Fig. 48) lives in marshy ground as well as in dry, but always near the sea. Its tufts and cushions of deep green, thread-like leaves, and round heads of pink flowers on their wiry little stems, are as well known as any wild flowers we have. Notwithstanding its second name, it is not related to the Pink family, to which the Campion and Stitchwort belong.

The *five* divisions of the corolla (which we should call petals, only they are joined below) are slightly notched. The calyx, or outer cup of the flower, is thin and papery. It acts as a float or sail for sending the seeds about. Mixed with the flowers are chaffy scales. Below there are some more, the outside ones turning back over the top of the stem. The rootstock is very tough and woody, its feeding threads going down a great way. The leaves are very narrow, giving off the least possible water-vapour.

3. Yellow Horned Poppy (*Glaucium flavum*).

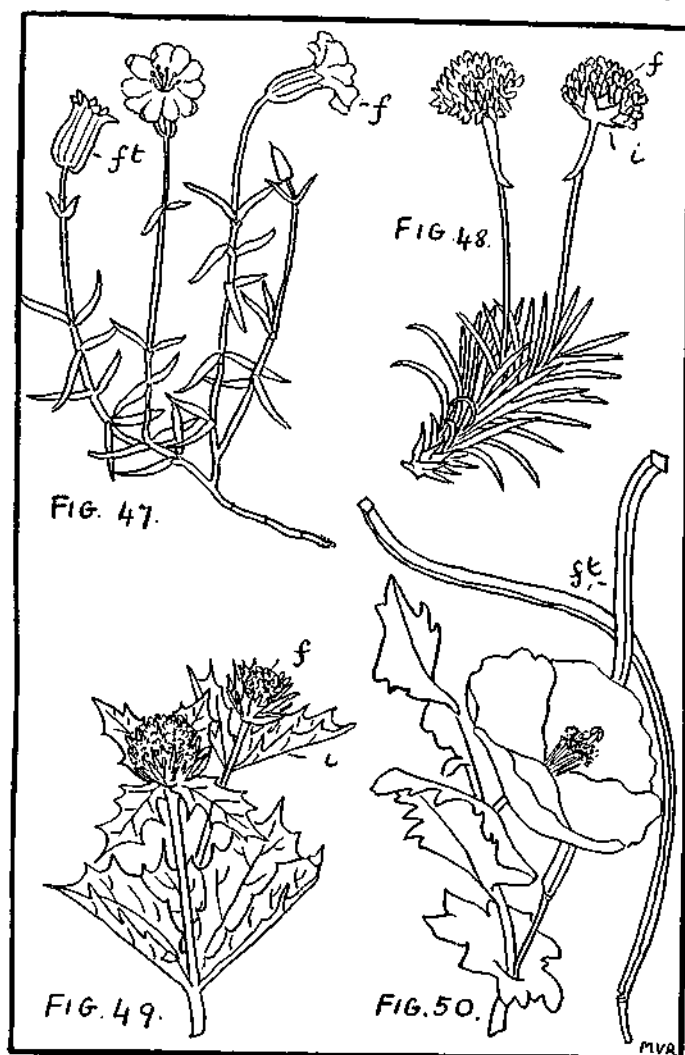
This (Fig. 50) is no doubt the most handsome of our seaside flowers. It is almost as

large as the scarlet Poppy of the cornfields. The colour is a rich amber-yellow, like that of the Greater Celandine, but of course it is very much larger. It also has very long seed-pods, but these again are very much bigger than those of the Celandine. They are 10 or 12 inches long, curved and rather rough with little lumps on them. The leaves, which are waved and cut into lobes, clasp the stems. The short, thick hairs that cover them make them harsh to the feel, and they are a very pale blue-green. This colour, so often seen in seaside plants, is called **glaucous**, from a Greek word meaning sea-green.

The rosette of leaves is quite a feature of the shingle in the autumn, winter, and spring, before the flower-stems come. I have always been a great admirer of these rosettes of **biennial** plants (coming up one year, flowering the next, ripening their seed, then dying), such as the Horned Poppy, Prickly Ox-tongue, Dyer's Weed, many thistles, and smaller fry like the Shepherd's Purse and the Wall Cress.

The root of the Horned Poppy is dark yellow, and spindle-shaped, something like a small carrot. It is what we call a **swollen taproot**, and holds a store of food.

PLATE XV.



SEA-SAND AND SHINGLE PLANTS

Fig. 47, Sea Campion; Fig. 48, Thrift; Fig. 49, Sea Holly;
 Fig. 50, Yellow Horned Poppy.

4. Sea Holly (*Eryngium maritimum*).

The Sea Holly (Fig. 49) is well named, for its stiff, hard, spiny, or sharply toothed leaves remind us of the berried tree of Christmas time. But instead of being glossy and myrtle-green, they are grey and dull of face. However, they are beautifully veined with white. The lower ones are stalked; the upper ones clasp the stems with their broad bases. The pale-blue flowers are in oval balls. Both the petals and the sepals are sharp-pointed, with a frill or *involucre* beneath. This is formed of leaves like those on the stem, but much smaller and narrower.

The flowers of the Sea Holly at a first glance look like thistles, but really the plant belongs to the Umbellifer family, like the Wild Beaked Parsley, the Carrot, and the Parsnip.

5. Prickly Saltwort (*Salsola Kali*).

This is also a spiny plant, but in quite a different way from the Sea Holly. Its leaves are all spine, so to speak. They are shaped like an awl, or a thick, three-sided needle. They end in a point, and the upper leaves are shorter and thicker than the lower ones. The flowers are *inconspicuous*, a nice long word which means they are too small or poorly coloured to be easily noticed. They are made

up of a green perianth (I, 3) of *five* parts. Inside are the *five* stamens and the stigma, which has a *double* style. They are seated right in the axil or angle of the leaves.

The plant (which is an annual) is easily known. The stems, which are a fine green, are usually much branched, and rough with tiny spines. It spreads along the ground, but is not so flat as the Sea Campion. Its ability to stand drought is seen in its fleshy stems, covered with a thick skin, so that it can store water, and give it off slowly.

It is gathered, and even grown, especially in the south of France and in Spain, for a kind of soda it gives, used in making glass and soap.

6. Beet (*Beta maritima*).

The Wild Beet (Fig. 53) belongs to the Goosefoot Family, like the Saltwort and many other seaside plants. This family is known by its *incomplete* flowers, without any true calyx or corolla, but formed of a little greenish perianth, a star of *five* short rays, which does not fall off, but remains to cover the seed. This perianth grows bigger as it gets older, and often becomes chaffy or papery.

In the Beet the rays have sharp points. When the perianth ripens, it forms a hard, sharp-edged, and often prickly mass, covering

a *single* seed. The flowers grow in long, loose strings, sometimes upright, sometimes spreading. The leaves are a deep, glossy green. Those on the flowering stems are small and narrow, and the lower leaves, which are large and thick, taper both to their petioles and upwards, and so are *diamond-shaped*. This feature helps us to know the Beet from its relations on the shore.

The root lasts several years. It is large, thick, and fleshy, giving promise of the farm and garden plants which have come from it, such as the Mangel Wurzel and the Kitchen Beet. The last-named is much grown abroad, and of late years in England, for its sugar. Varieties with large, handsome leaves of different rich colours may be often seen in public gardens. The Spinach of kitchen gardens belongs to the same family; so does Good King Henry, which is often seen about villages, and used to be cooked in the same way as spinach.

7. Stagshorn Plantain (*Plantago Coronopus*).

The Stagshorn Plantain is not nearly so handsome as its sister of the chalk country, the Hoary Plantain. The anthers, instead of being purple and showy, are small and faint yellow, and later turn brown. There is little

in them to make us want to look at them. The interest of the plant lies in its leaves, which are different from those of any other plantain. They are cut into many narrow divisions, like the antlers of a stag, and are covered with fine hairs. Both these features help to keep moisture in the plant. It is sometimes found in dry places, far from the sea.

8. Sea Plantain (*Plantago maritima*).

Turning now from the dry parts of the shore to the wet, we often see, among the sea rushes, sea sedges, and sea grasses, spikes of dull flowers very like those of the Stagshorn Plantain, though rather bigger. The leaves, however, are not divided like those of the Stagshorn Plantain, or broad like those of the Great Plantain and the Hoary Plantain, but long and narrow, like a grass. They are channelled (gutter-shaped) and sometimes toothed on the edges. They are also very thick and fleshy. This fleshiness is a leading feature of the plants of the shore, especially of the marshy parts of it. These thick leaves store water as a camel's stomach stores water, and for the same reason: the plants and the camel live where drinking water is scarce. On the desert it is hard to get at all, and on the

sea-shores it is not fit to drink, either by man, beast, or plant.

9. **Sea Arrowgrass** (*Triglochin maritimum*).

Alongside the Sea Plantain we often meet with a plant whose leaves look at first glance just like those of its neighbour. They are not so flat, but rather three-sided or even roundish, like a rush, only thicker. The flower-spikes are long, taking up a full half of the stems. It is when we examine the flowers themselves that we see the great difference. They are equally colourless—that is to say, greenish (not a colour we expect to see in a flower)—and no prettier. But instead of the parts being in fours, they are in *threes*, telling us that the Sea Arrowgrass is a “monocot,” like the Daffodil, the Water Plantain, and the Black Bryony. There is a perianth of *six* blunted rays, around *six* stamens, and *six* small feathery stigmas. The flowers are *sessile* (seated on the stems), but the fruit, as it forms, grows a short stalk.

The Sea Arrowgrass, like the Stagshorn Plantain, is sometimes seen far from the shore. There is also the Marsh Arrowgrass (*T. palustre*), which grows in swampy places inland, but usually not far from the sea. It is a more slender plant, and has a thinner fruit than its seashore relative.

10. Sea Lavender (*Limonium vulgare*).

The Sea Lavender (Fig. 51) is far and away the best beloved of seaside plants, and few flowers are more prized for vases, the more so as they keep their colour for a long time when dried. Even when the grey-purple-blue corolla has faded, the silver-and-pale-tan calyx is good to look at. The flowers, taken separately, are something like those of the Thrift, to which the plant is closely related. But they are smaller and of course differently coloured, and it is on this account that they are called "Lavender." They have nothing to do with the Sweet Lavender so largely grown for its scent. That plant belongs to the Lipped Family (*Labiatae*), like the Bugle.

In the way the flowers come on the stems the Sea Lavender is not at all like its relation the Thrift. Instead of being crowded in a head, they are borne in what the botanists call a **panicked unilateral cyme**. This is frightful language to those who are afraid of words. Still, words, after all, form the chief difference between man and "the beasts that perish." But really these three words make a simple and useful description. "Panicked" means a branched cluster of flowers. "Unilateral" means that the flowers come on only one side of the stem. And "cyme" is what

we see in the Meadowsweet (IV, 11) and the Stitchwort (II, 8). Those three words save many words that otherwise we should have to use.

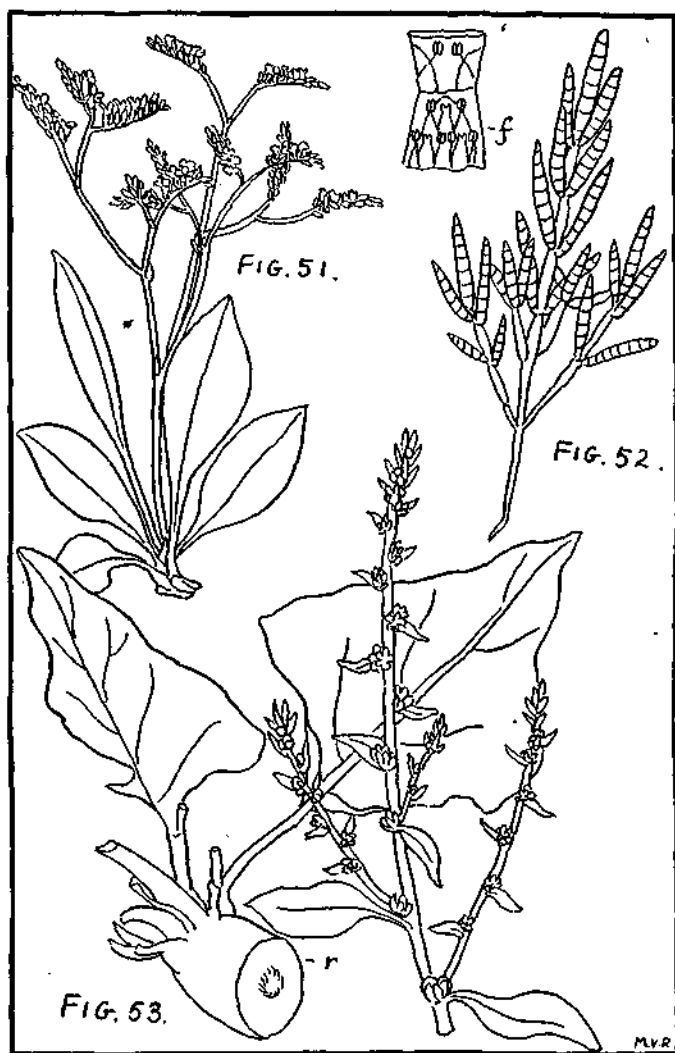
To describe the leaves of the Sea Lavender we must bring in another hard word. They are *oblanceolate*—that is, spear-shape reversed, long, and tapering—but the broadest part is near the tip or end of the leaf, not near the base, as it is with the ordinary spear-shaped leaf. The leaves are all at the ground-level, are bright green, leathery, and have a small point or beak at the top. The root-stock is woody and very tough. The naked, wiry flower-stems vary from a few inches to a couple of feet in height.

The Sea Lavender, like the Thrift, is a plant that grows in crowds, often in great crowds, and when in flower lights up the salt marshes for yards, sometimes acres.

II. Sea Starwort (*Aster Tripolium*).

This is one of the tallest of our seaside plants, often reaching 3 feet in height though sometimes only as many inches. Its flowers are built on much the same plan as those of the Daisy, to which, indeed, it comes next in the long list of Composite flowers. It is a Michaelmas Daisy. The ray-florets are lavender-blue—

PLATE XVI.



SALT MARSH PLANTS

Fig. 51, Sea Lavender; Fig. 52, Jointed Glasswort;
 Fig. 53, Wild Beet.

much the same shade, in fact, as that of its "frequent pardner" (to quote Mrs. Gamp), the Sea Lavender. They are not so prettily arranged as those of the Daisy, though the flower-head is larger. They appear rather thinly and unevenly, and sometimes are entirely absent, when the plant has no claims to beauty at all. This rayless form is considered to be a different species. The flower-heads do not come one on a stalk as do those of the Daisy. The tall, thick, leafy stem of the Sea Starwort bears a cluster, that flat-topped cluster which botanists call a corymb. It has foot-stalks starting from various points near the top of the stem, and of suitable differences in length, so as to end at much the same level. We first spoke of a corymb when we were looking at the Meadowsweet. Now we ought to say that, poor as the flowers of the Sea Starwort are taken singly, when they appear in quantity, as they often do, they make a pleasant sight in the dreary mud-flats in which they live. The leaves are somewhat long and narrow, but their fleshy thickness shows their ability to stand seashore drought.

12. **Jointed Glasswort** (*Salicornia europæa*).

On the muddy salt-flats of our foreshores and tidal rivers, this little annual (Fig. 52) is

one of the commonest and best suited plants. Better than almost all others it is built for its work of standing the salt-water drought of the seashore. Its form is, on a very small scale, that of the giant pillar-cacti of the dry plains and hills of Central America. It has no leaves, and the very fleshy stems are in joints. These jointed stems are of a bright green during, at all events, the greater part of their one season. This shows that they do the work of green leaves in making food out of the air. But late in the year, when all flowers are over everywhere, these stems beautify the mud by turning many fine colours, such as yellow, orange, scarlet, crimson, and purple. If you love colour, go to the nearest mud-flat in October, and feast your eyes.

The Glasswort varies a good deal in its height, branching, and habit. Sometimes it appears as a tiny stem, scarcely an inch high. Sometimes it grows 6 or 7 inches, with a number of upright branches. Sometimes it lies down on the wet ground. To all these forms special names have been given. The flowers are green and not at all showy, for it belongs to the Goosefoot family, like the Beet and the Saltwort. However, these flowers are not without interest. They are sunk in the short upper joints of the plant, forming, as we may say, spikes at the tops of the stems.

Each joint bears *six* flowers, *three* in a triangle on each side. The perianth is fleshy, flat, and nearly closed at the top. The *one* or *two* stamens just show through, and the *two* or *three* stigmas stay inside.

This plant, like the Saltwort, used to be valued for its soda. It is still collected for pickling, instead of the Samphire. This is also a fleshy seaside plant, but belongs to the Umbellifers or Carrot family. The Glasswort is often called the False Samphire.

EXERCISES

(1) Find good specimens of the flowers described in this chapter. Draw them as well as you can and colour the drawings as nearly as you can to the colours of the flowers when fresh. Mark by means of arrows the different parts of the flowers in these drawings.

(2) Note in what positions you found the flowers mentioned in this chapter, in what soil they were growing, sand, clay, chalk, etc.

(3) Write out and learn the meanings of the words in the Word List.

(4) Watch the plants of this chapter and note what insects visit the flowers.

(5) How are Seashore Plants able to live near the salt sea?

(6) What biennial plants do you know of?

(7) Obtain a Mangel Wurzel plant, or a Beetroot, and notice how it is like and unlike the Wild Beet.

WORD LIST

- | | | |
|------------------|---------------|------------------|
| 1. adaptation | 4. involucre | 10. paniced uni- |
| 3. glaucous | 6. incomplete | lateral cyme |
| biennial | flower | oblanceolate |
| swollen tap-root | | |

MISCELLANEOUS QUESTIONS

(1) What ways have plants of reproducing themselves (making new plants)?

(2) How do you know a monocotyledon from a dicotyledon?

(3) Describe the root, stem, leaves of (a) Foxglove; (b) Deadnettle; (c) Dandelion.

(4) What do you understand by (a) cladode; (b) panicle; (c) spadix; (d) umbel; (e) raceme; (f) spike?

(5) What is meant by pinnate, pappus, oblanceolate, sessile?

(6) What flowers have you seen visited by (a) Honey-bees; (b) Humble-bees; (c) Wasps; (d) Moths? What did they do?

(7) What does a plant need in order to grow and flourish?

(8) What is meant by pollinia, corymb, petiole?

(9) What do plants do to give their seeds a good start in the world?

(10) What is meant by (a) corymbose cyme; (b) panicked unilateral cyme?

(11) What distinguishes the family of the Umbelliferae and what plants have you come across belonging to that family?

(12) And the Cruciferae?

(13) And the Labiatae?

(14) And the Compositae?

(15) And the Rosaceae?